THE INSECTS AND ARACHNIDS OF CANADA

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PART 16

The Horse Flies and Deer Flies of Canada and Alaska

Diptera: Tabanidae

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Ottawa, Ontario

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Introduction

Flies of the family Tabanidae, commonly known as horse flies and deer flies,[1] are well known to anyone who spends at least a moderate time outdoors in the summer, away from densely populated areas. The blood-sucking behavior of the great majority of these flies is threatening, and even the possibility of being bitten by them as they fly around humans and wild and domesticated animals (in the case of horse flies, very noisily) can cause great anguish. Significant economic losses among livestock have been documented (Steelman 1976; Persch et al. 1986). Also, the proven potential of these flies to transmit mammalian diseases is always a threat.

There are important reasons to know the fauna and its distribution well and to be able to identify, with the least amount of difficulty, all the species. The most satisfactory method of doing this is by use of identification keys, in conjunction with adequate descriptions and illustrations of genera and species. This publication is the first modern attempt to fulfill the requirements for identifying all the currently recognized species of Tabanidae of Canada and Alaska and to plot collection records of these species, thus giving an indication of their distribution.

Although sources of identification of most Tabanidae species are available, they are either in older publications, whose information may be out of date or incomplete, or the treatment may be of a fauna somewhat different from the one to which it is being applied and thus may lack some of the species in the area of concern.

The more useful general identification aids dealing with tabanids of North America have been those of Stone (1938) for species of the Tabaninae, Brennan (1935) for species of Pangoniinae and Chrysopsinae, and Philip (1955) for species of the genus *Chrysops* alone. All these works remain valuable, especially the first two, despite their age and associated deficiencies, because they include descriptions of the species, which allow additional means of checking identifications of damaged specimens that may have key characters obliterated or those specimens that may vary from the norm. Regional identification manuals include those of Pechuman, Teskey, and Davies (1961) for Ontario; Chagnon and Fournier (1943) for Quebec; Lewis and Bennett (1977) with additions by Thomas (1978) for the Maritime Provinces; and Thomas (1973) for the *Chrysops* of Alberta. There are also several publications from adjacent regions of the United States of which those of Pechuman (1981*a*) for New York; Hays (1956) for Michigan; Pechuman, Webb, and Teskey (1983) for Illinois; and Roberts and Dicke (1958) for Wisconsin are applicable in part to eastern Canada, and those of Nowierski and Gittins (1972) for

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[1] The name horse fly is applied primarily to the species of *Hybomitra*, *Tabanus*, and *Atylotus*, whereas deer flies refer to smaller species of other genera, mainly *Chrysops*.

Idaho and Turner (1985) for Washington are applicable to the western fauna, particularly that of British Columbia. Although covering an area much further afield, the publication by Middlekauf and Lane (1980) on the Tabanidae of California has important application to the British Columbia fauna.

In using this publication as an identification guide it is strongly recommended that after determining the species with the appropriate key, the specimen be compared with the species description, including associated illustrations and known range, as a final check on the accuracy of the identification. Some of the critical diagnostic features of Tabanidae involve small differences in color or dimensions of structures, which may not be expressed in the keys in a way that will be clearly understood by everyone. Through the use of the full descriptions and illustrations, the difficulty is more likely to be clarified and greater confidence in the identification gained.

Life history

The seasonal activity of adult Tabanidae in Canada normally extends from late May to mid September, although *Chrysops noctifer*, *Tabanus punctifer*, and *Hybomitra procyon*, which in southern British Columbia live in a more moderate climate, have been collected as early as late April. No single species has been found to be active over the whole period, although a few, in particular *Chrysops aberrans*, *C. proclivis*, *Hybomitra frontalis*, and *H. atrobasis* have been collected over much of it. The shortest period of activity among moderately common species is that of *Chrysops geminatus*, which is restricted to the month of July. The period of activity of most species is in excess of 2 months. Each species has its particular flight season, which seems to vary little from year to year. Thus, the date of first appearance of most species can be predicted very closely. Because of the influence of temperature, northern populations of wide-ranging species begin activity later than more southern representatives, and their season is often shortened in the fall.

Most species are active only during daylight hours on warm sunny days when there is little or no wind. However, some species, such as *T. sackeni* and *T. catenatus*, are normally of crepuscular or nocturnal habits, and a number of other species have been collected at electric lights in evening and nocturnal hours (Pechuman 1981).

Climatic factors have a profound effect on daily activity (Tashiro and Schwardt 1949; Jamnback and Wall 1959; Miller 1951). For much of Canada the lower temperature threshold is about 13°C. Tabanidae are strong fliers and do not seem to be affected by winds below 10 km/h. Light intensity is very important, apart from its diurnal affect. My first introduction to Tabanidae was at Churchill, Man., where very high populations of these flies were evident by a noticeable humming sound of their flight, as well as by their annoying behavior. A cloud obscuring the sun created almost instant silence. Also, at a certain point in the approach of a bank of clouds, presaging a deterioration of the weather and before any effect on light, a sudden cessation of flight would occur apparently associated with a rapid atmospheric pressure change. Any effect of relative humidity is difficult to separate from the influence of temperature. Burnett and Hays (1974) have analyzed the influence of weather factors on tabanid activity by means of regression analyses and have listed the weather factors in order of decreasing importance to be as follows: barometric pressure, temperature, evaporation, rate of change in sky radiation, wind velocity, and rate of change of relative humidity and temperature.

Adults normally emerge from the pupal cases in the morning and, after a short interval to expand and harden the wings and body cuticle, are capable of flight. Apparently one of their first functions is to mate, since almost all females collected in the field and especially those attracted to animals have spermatozoa in the spermathecae (Le Prince et al. 1983 and unpublished observations of the author based on a variety of species).

Summaries of observations on mating behavior of a variety of species have been published by Bailey (1948) and Wilkerson, Butler, and Pechuman (1985). Males take stations, either hovering individually or in small groups near ground level to above the forest canopy or waiting on vegetation or other appropriate objects such as rocks adjacent to flyways that females use. From these sites the males chase females flying past, not always of the same species, in which case the male may return to its original station. If correctly associated, the pair may couple and insemination occurs. Such hovering and waiting stations are often on the tops of hills. Le Prince et al. (1983) observed males of 17 species of *Chrysops*, *Hybomitra*, and *Tabanus* on one such hill in Quebec. The particular site of these activities and the many variables associated with them such as height above ground, plant association, and time of day, for example, are species-specific.

Adult Tabanidae must feed to sustain energy and to reproduce. The primary energy source is sugar, acquired by feeding from the nectaries of flowers or taken in the form of honeydew (the excretions of plant-feeding insects, mainly aphids) that is sponged by the labellae from leaves of trees and other plants. These sugars provide energy for flight, especially important during mating and in finding a blood source.

A blood meal is necessary for most Tabanidae to develop at least a portion of their potential egg production. Among these so-called hematophagous species an increasing number are being recognized as not needing a blood meal for maturation of the first batch of eggs. Sufficient nutrient supply in the form of fat body is carried over from the immature stages to complete the first gonotrophic cycle. A blood meal is normally necessary for subsequent cycles of egg development.

The production of eggs without a blood meal is called *autogeny*, whereas dependence on a blood meal is called *anautogeny*.

Two other terms are important in understanding literature on ovarian development. *Nulliparous* refers to a female that has not laid eggs, whereas a fly that has laid eggs is said to be *parous* with the prefixes uni-, bi-, or tri- referring to the number of ovarian cycles completed. The physiological age of the specimen can be determined by the number of ovarian cycles completed. Detinova (1962) describes the changes in the ovarioles of hematophagous Diptera after successive ovarian cycles, and Rockel (1969), Thomas (1972), Magnarelli et al. (1975, 1980, 1982), and Lake and Burger (1980) have used this knowledge in determining the autogenous and anautogenous egg production of a number of common North American species.

At least one species, *Apatolestes actites* Philip & Steffan, found on California marine beaches, can complete multiple ovarian cycles without blood meals (Lane et al. 1983). Because of its greatly reduced mandibles, this species is incapable of taking a blood meal. Chvala, Lyneborg, and Moucha (1972) cite several European species, including two *Atylotus*, that apparently never seek a blood meal. There are several relatively common North American species, also including some *Atylotus*, that have never been observed seeking a blood meal. However, these species have well-developed mandibles. The accuracy of these observations and the extent of the condition are important fields for future observation and experimentation.

Tabanidae are most visible in their blood-sucking attacks on large animals, including humans. Many species show preference in hosts and in location on the host where the blood meal is taken. What use they make of the blood of smaller animals, birds, and reptiles is poorly understood.

Most animals are quite aware of being bitten and take appropriate defensive measures, which frequently results in the tabanid's having to leave the host with only a partial meal. This interruption may require the fly to go to another host to obtain sufficient blood, which provides ideal conditions for disease transmission—first, feeding briefly on a diseased animal, then having to complete its blood meal on another animal to which it transfers the disease organisms. Tabanidae have been implicated as vectors or potential vectors of many diseases of which tularemia, equine infectious anemia, vesicular stomatitis, hog cholera, encephalitis, anaplasmosis, trypanosomiasis, and filarial dermatosis of sheep are pertinent to North America (Krinsky 1976).

Eggs are normally ready for deposition about 4–8 days following a blood meal, depending on temperature. Egg masses are deposited on warm sunny days, usually during the morning. The eggs are laid in compact masses, usually on the stems of plants or under surfaces of leaves overhanging water or wet soil, where the larvae of most species live. However, egg masses are found occasionally in very dry situations, which suggests that larval habitats may be much broader than currently supposed.

There are marked differences between some species in the arrangement, shape, and dimension of egg masses and number of eggs in the mass. Eggs are laid at an angle to the substrate varying from about 15 to nearly 90°, in moderately uniform rows, each egg glued to adjacent ones and to the substrate. Many *Chrysops* deposit only single-layered egg masses, whereas others of this genus and apparently most species of other genera deposit two- to four-tiered egg masses. When first laid, the egg masses are rather pallid in color, but the chorion of the outer eggs soon darkens to brown or blackish. Egg masses of *Hybomitra lasiophthalma* are jet black and look much like a drop of tar. Egg masses of some species are held together loosely, whereas others, such as those of the above-mentioned species, are securely glued together. The number of eggs in a mass varies from less than 100 to 700–800, the larger numbers being from some species of *Tabanus* and *Hybomitra*.

Descriptions of egg masses are scattered through the literature, and most are very brief. There is a great need for more detailed descriptions of egg masses of many more species.

Embryonic development of the eggs is completed within 4–6 days under normal conditions. Hatching usually occurs in the morning, after some warming by the sun. All eggs in a mass hatch almost simultaneously. I saw this on one occasion upon finding a three-tiered mass on the leaf of a low shrub on a wet spring-fed drainage slope. The leaf bearing the intact mass was pulled from the shrub, and in a few seconds, while I straightened up but before I looked at the egg mass again, all the eggs had hatched and appeared as a writhing mass of small larvae bathed in a liquid that possibly surrounded the larvae in the eggs. However, the vegetation was quite wet from a predawn rain, and the egg mass may have touched wet vegetation before it was examined.

Newly hatched larvae drop to the substrate beneath the mass, which usually consists of water or wet soil. Very little detail is known of the behavior and movements of the larvae in the soil or water. Egg masses are almost always found over or near substrates in which mature larvae can be found at other times. Consequently, the larvae probably do not need to migrate great distances to find a suitable habitat. Larvae dropping into flowing water apparently either sink to the stream bed or are carried by the current to the shoreline. Along stream shorelines the greatest numbers of larvae have been found near areas where currents are most likely to deposit the small larvae. Larvae of several species inhabit the stream bed and probably reach there after emergence from the egg mass, simply by sinking to the bottom.

Larvae pass through a variable number of instars, 7–11 apparently being more common among Tabaninae and 5–7 among *Chrysops* (Olsufjev 1977). The first instar is very brief, the first molt occurring shortly after eclosion to replace the "egg burster," or upright prong, on the head capsule by the normal head structure that is more appropriate for feeding

Larvae of all Tabaninae that have been reared feed readily on soft-bodied insect larvae and earthworms and may use microorganisms as an important part of their diet. The larval head capsule has a well-developed filtering apparatus that might strain food materials from a liquid substrate. The food of *Chrysops* larvae, on the other hand, is unknown. They have never been observed to attack living invertebrates and have never been reported as having been raised in confinement from an early instar to adult.

The developmental period of the larvae in middle latitudes is normally 9–10 months. Some tropical and subtropical species may have two generations per year, and some far northern species may require 2–3 or more years to complete their life cycle.

When full grown, and in the appropriate season, larvae migrate to situations where they are unlikely to be submerged in water for extended periods of time and pupate in a vertical position just below the surface of the substrate. The pupal period normally lasts 1–3 weeks, depending on the temperature and the species (tabanines normally taking longer than *Chrysops*). Adults emerge from pupae, again usually in the morning, and after a short rest to expand their wings and harden the cuticle, they repeat the cycle.

The immature stages and the adults are attacked by a variety of parasites and predators (Cameron 1926; James 1952; Parmon 1928; Tashiro and Schwardt 1953; Teskey 1969). Eggs are parasitized by the Hymenoptera *Trichogramma semblidis* (Aurivillius) (= *minutum* Riley) (Chalcididae) and *Telenomus emersoni* Girault, *T. tabanivora* (Ashmead), and *T. goniopsis* (Ashmead) (Proctotrupidae). The last-named species is known only from the eggs of *Goniops chrysocoma* (Osten Sacken), a primitive tabanid that is known in Canada in only a few Ontario localities. Egg parasites are apparently the most important natural control agents of Tabanidae. Most egg masses are parasitized, with frequently 50% of the eggs destroyed. Two Hymenoptera, *Trichopria tabanivora* Fouts (Diapriidae) and *Diglochis occidentalis* (Ashmead) (Pteromalidae), and the Diptera *Carinosillus tabanivora* (Hall), *Vibrissotheresia pechumani* Reinhart (Tachinidae),[1] and *Villa lateralis* Say (Bombyliidae) have emerged from larvae or pupae of a variety of Tabanidae. Only the tachinid parasite completes its larval development within the larval host, leaving it and pupating. *Villa lateralis* and the two Hymenoptera emerge from the tabanid pupae, thus completing most of their larval development within the pupa. That the parasites normally lay their eggs in the larvae of Tabanidae seems certain, since the parasites have emerged from pupae collected as larvae and reared in closed jars in the laboratory.

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[1] Wood (1987) places the species of *Carinosillus* and *Vibrissotheresia* under *Arctophyta* Townsend.

These larval and pupal parasites appear to have little impact. In Teskey's (1969) extensive rearing of tabanid larvae, parasitism accounted for only 2% mortality. James (1952) reports somewhat higher levels of parasitism by *Diglochis occidentalis* at Churchill, Man., where high populations of Tabanidae occur.

Adults are also eaten by birds, dragon flies (Odonata), robber flies (Asilidae), and wasps of the genera *Vespula*, *Crabro*, and *Bembix*, but the impact of such predation is unknown.

Distribution

One hundred and forty-five species of Tabanidae are known to occur in Canada and Alaska (Table 1). Another five species have a range closely approaching the Canadian border and are likely present in Canada, and are therefore included in this work. Members of the family are found in all parts of the region except the northern tundra zone, where trees are absent. As would be expected, there is great diversity in the distribution of these species and in their relative abundance. The latter is unimportant in the present context, but for most species it would seem to be more or less directly related to the size of the species range.

Another measure of abundance is the relative number of specimens of each species in the Canadian National Collection, Ottawa, Ont. The index has a rating of 1–10, in direct relationship to higher abundance, and is given in the right-hand column of Table 1.

The distributional aspect that will likely be of interest to many users is that related to the major political boundaries of the region (Table 1). However, the natural distribution of the species is of greater biological interest. Among the larger taxonomic units, only a quarter of the species of Pangoniinae in North America occur in Canada and Alaska. This subfamily has a dominantly tropical to warm-temperature distribution. On the other hand, the Chrysopsinae (*Chrysops* mainly), with 45 of 86 North American species in Canada, are more evenly distributed on the continent. Among the Tabaninae, the genus *Tabanus* has a more southern distribution, and most of these species reaching Canada do not occur very far north. *Hybomitra*, on the other hand, is characterized by its dominant northern distribution, which sees most of the ranges of most species within Canada and Alaska. *Atylotus* is a midcontinental genus, with the ranges of both eastern and western species, like those of Tabanus, not extending very far north of the 49th parallel.

The distribution of all species shows several fairly clear patterns. First there is that of dominantly southern species, usually present to the Gulf of Mexico, that only just reach southern Canada. In the eastern half of the continent they include the following: *Chrysops callidus*, *C. brunneus*, *C. carbonarius*, *C. celatus*, *C. cincticornis*, *C. flavidus*, *C. geminatus*, *C. macquarti*, *C. moechus*, *C. montanus*, *C.*

niger, *C. pikei*, *C. pudicus*, *C. univittatus*, *C. vittatus*, *Goniops chrysocoma*, *Merycomyia whitneyi*, *Tabanus americanus*, *T. atratus*, *T. calens*, *T. fairchildi*, *T. limbatinevris*, *T. lineola*, *T. nigripes*, *T. pumilus*, *T. quinquevittatus*, *T. sackeni*, *T. stygius*, *T. sulcifrons*, *T. trimaculatus*, *Hybomitra cincta*, and *H. lasiophthalma*.

The western counterparts of the above species include *Chrysops fulvaster*, *Tabanus aegrotus*, *T. kesseli*, *T. laticeps*, *T. punctifer*, and *T. stonei*.

Two other species fitting the above category are *Chrysops fuliginosus* and *Tabanus nigrovittatus*. However, as they are salt marsh inhabitants, they are restricted to the eastern seaboard.

A large group of species occurring in Canada are characterized by their mideastern (or, more accurately in some cases, Great Lakes–St. Lawrence River) distribution. Such distributions are centred south of the Great Lakes and St. Lawrence River and in Canada are usually restricted to the southern parts of Ontario and Quebec, the Maritime Provinces, and then south no farther than the Carolinas, often following the Appalachian Mountains but frequently no farther than Pennsylvania or West Virginia. The species involved are as follows: *Stonemyia tranquilla*, *S. rasa*, *Chrysops aberrans*, *C. calvus*, *C. cuclux*, *C. delicatulus*, *C. indus*, *C. lateralis*, *C. sackeni*, *C. shermani*, *C. striatus*, *C. venus*, *Atylotus bicolor*, *A. duplex*, *A. ohioensis*, *A. palus*, *A. sphagnicolus*, *A. thoracicus*, *Tabanus catenatus*, *T. fulvicallus*, *T. marginalis*, *T. novaescotiae*, *T. reinwardti*, *T. sagax*, *T. subniger*, *Hybomitra aurilimba*, *H. criddlei*, *H. frosti*, *H. hinei*, *H. microcephala*, *H. sodalis*, and *H. typhus*.

An extreme northeastern distribution to, or nearly reaching, the treeline and the limits of Tabanidae in northern Quebec is found in *Chrysops sordidus*, *C. zinzalus*, *Tabanus vivax*, *Hybomitra aequetincta*, *H. longiglossa*, and *H. minuscula*.

Hybomitra minuscula and *Tabanus vivax* are similar in inhabiting the Great Lakes region, with a spur to West Virginia, whereas the other species, except *H. aequetincta*, extend only into the New England States. The last species is restricted to the zone of relatively stunted trees in Quebec north of the latitude of James Bay.

The northern proclivity of *Hybomitra* and of some *Chrysops* has been mentioned. Many of these species have extensive ranges, to the point of being transcontinental, with most reaching Alaska and only *Hybomitra pechumani* and *Chrysops aestuans* ending near the coast of British Columbia. Such transcontinental distributions are found in the following species: *C. aestuans*, *C. ater*, *C. dawsoni*, *C. excitans*, *C. frigidus*, *C. furcatus*, *C. mitis*, *H. astuta*, *H. epistates*, *H. frontalis*, *H. hearlei*, *H. illota*, *H. itasca*, *H. liorhina*, *H. lurida*,* *C. nigripes*,* *Atylotus hyalicosta*, *A. sublunaticornis*,* *Tabanus similis*, *H. affinis*, *H. arpadi*,* *H. nitidifrons* ssp. *nuda*,* *H. pechumani*, *H. trepida*, and *H. zonalis*.

The species marked by an asterisk, as well as *Hybomitra aequetincta* (mentioned previously), *H. polaris*, and *H. sexfasciata*, are Holarctic, i.e., they are present in North America and Asia; North

America and Europe; or North America, Asia, and Europe. The fact that most of the above-mentioned species have been collected in Alaska near the coast of the Bering Sea is indicative of a Holartic distribution. The most obvious exception is *H. aequetincta*, whose northern Quebec–Labrador distribution has no obvious connection to its Asian range, which extends from the northern European part of the USSR across Siberia to the Bering Sea. An entry point other than the Bering land bridge is possible for this species, but it is more probable that the species has been eliminated from the Alaska–Yukon–Northwest Territories invasion route to northern Quebec.

Most of the transcontinental species have a more boreal distribution, avoiding the treeless prairies, and then extending south along the western mountains, in some cases to Colorado. One obvious exception to this is *Hybomitra frontalis*, which is present in all areas of Canada below the treeline and in several localities well north of the treeline. In addition, by following tree growth along river courses, it is present in the northeastern states to the Dakotas and Montana, and south to Colorado. This is the largest range of any species of Tabanidae in North America.

The prairie region is occupied by relatively few species. Only one, *Hybomitra pediontis*, appears to be restricted to this area, with collection records from similar habitats south to Colorado. Other western plains species not restricted to the drier prairie environment but also commonly found in adjacent mountainous terrain are *Chrysops discalis*, *Haematopota americana*, *Atylotus calcar*, *Hybomitra opaca*, *H. rhombica*, and *H. tetrica*.

All the above have extensive ranges extending into British Columbia and south at least to Colorado or central California.

The remaining western species are apparently confined to mountainous terrain. The species with northern and southern limits similar to the above are *Stonemyia californicus*, *S. fera*, *Silvius gigantulus*, *Chrysops noctifer*, *Atylotus insuetus*, *A. tingaureus*, *Hybomitra fulvilateralis*, *H. melanorhina*, *H. osburni*, *H. procyon*, and *H. rupestris*.

Species with a range restricted to the Pacific Northwest, with an extension in some cases to southern California, are *Chrysops asbestos*, *C. coloradensis*, *Tabanus fratellus*, *Hybomitra californica*, *H. captonis*, *H. enigmatica*, *H. lanifera*, *H. sequax*, and *H. zygota*.

Chrysops coloradensis and *C. proclivis* have a somewhat narrower and attenuate distribution, essentially confined to the Cascade Mountains, the Sierra Nevada, and the Coastal Mountains between southern British Columbia and California. An even narrower distribution is that of *Hybomitra sonomensis*, which like *Tabanus nigrovittatus*, is a coastal species, but in this case it is the West Coast, from Alaska to California.

Table 1. Distribution of Tabanidae in Canada and in Alaska

	Newfoundland	Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Alaska	Abundance Index
Apatolestes															
comastes											●				1
Stonemyia															
californicus											●				1
fera										●	●				2
rasa						●	●								1
tranquilla			●	●	●	●	●								2
Goniops															
chrysocoma							●								1
Merycomyia															
whitneyi							●								1
Silvius															
gigantulus											●				2
Chrysops															
aberrans					●	●	●								6
aestuans			●	●	●	●	●	●	●	●	●				6
asbestos											●				6
ater	●	●	●	●	●	●	●	●	●	●	●	●	●	●	8
brunneus							●								2
callidus						●	●								5
calvus				●	●	●	●								5
carbonarius				●	●	●	●								4
celatus							●								1
cincticornis				●	●	●	●								6
coloradensis											●				1
cuclux				●	●	●	●								6
dawsoni						●	●	●	●	●	●	●	●		5
delicatulus					●	●	●								1
discalis								●	●	●	●				4
excitans	●	●	●	●	●	●	●	●	●	●	●	●	●	●	10
flavidus							●								1
frigidus	●	●		●	●	●	●	●	●	●	●	●	●	●	7
fuliginosus			●	●	●										2
fulvaster									●	●	●				4
furcatus	●	●		●	●	●	●	●	●	●	●	●	●	●	8
geminatus						●	●								4
indus						●	●	●							6
lateralis				●	●	●	●								5

Table 1. Distribution of Tabanidae in Canada and in Alaska (*Continued*)

	Newfoundland	Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Alaska	Abundance Index
Chrysops (cont'd)															
luteopennis							●								1
macquarti							●								3
mitis	●	●		●	●	●	●	●	●	●	●	●	●	●	8
moechus						●	●								3
montana					●	●	●	●							6
niger			●	●	●	●	●								5
nigripes	●	●				●	●	●		●	●	●	●	●	6
noctifer										●	●		●		6
pikei							●								2
proclivis										●	●				2
pudicus				●			●								2
sackeni						●	●	●							4
shermani			●	●	●	●	●								5
sordidus	●	●		●	●	●	●								5
striatus						●	●								5
surdus											●				1
univittatus					●	●	●								6
venus						●	●	●							4
vittatus				●	●	●	●								7
zinzalus	●			●	●	●	●								3
Haematopota															
americana		●				●	●	●	●	●	●			●	3
champlaini							●								1
rara				●											1
Hybomitra															
aasa															1
aequetincta		●				●									5
affinis	●	●		●	●	●	●	●	●	●	●	●	●	●	9
agora										●					
arpadi	●	●		●	●	●	●	●	●	●	●	●	●	●	6
astuta		●		●	●	●	●	●	●	●	●	●	●	●	6
atrobasis											●				4
aurilimbus						●	●								2
brennani	●			●		●		●	●	●					1
californica											●				3
captonis										●	●				6
cincta						●	●								1
criddlei						●	●	●							3

Table 1. Distribution of Tabanidae in Canada and in Alaska (*Continued*)

	Newfoundland	Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Alaska	Abundance Index
Hybomitra (cont'd)															
enigmatica										●	●				4
epistates	●	●	●	●	●	●	●	●	●	●	●	●	●	●	7
frontalis	●	●	●	●	●	●	●	●	●	●	●	●	●	●	10
frosti				●	●	●	●								1
fulvilateralis										●	●				4
hearlei		●				●	●	●	●		●	●	●	●	5
hinei							●								2
illota			●		●	●	●	●	●	●	●	●	●	●	7
itasca		●			●	●	●	●		●	●		●	●	1
lanifera										●	●				3
lasiophthalma			●	●	●	●	●	●	●	●	●	●			8
liorhina		●		●	●	●	●	●	●	●	●	●	●	●	5
longiglossa	●			●	●	●	●	●							4
lurida	●	●		●	●	●	●	●	●	●	●	●	●	●	9
melanorhina											●	●			2
microcephala					●	●	●	●	●						3
minuscula	●	●		●	●	●	●	●							4
nitidifrons nuda			●	●	●	●	●	●	●	●	●	●	●	●	7
opaca										●					2
osburni								●	●	●	●		●		7
pechumani				●	●	●	●	●	●	●	●	●	●		6
pediontis								●	●	●					4
polaris														●	1
procyon											●				3
rhombica								●	●	●					2
rupestris										●	●				3
sexfasciata								●				●	●	●	6
sodalis					●	●	●								5
sonomensis											●		●	●	5
tetrica							●	●	●	●	●	●	●	●	5
trepida				●	●	●	●	●	●	●	●	●	●	●	6
typhus				●	●		●								1
zonalis	●	●		●	●	●	●	●	●	●	●	●	●	●	6
zygota											●				1
Atylotus															
bicolor			●	●		●	●	●		●					4
calcar								●	●	●	●				4
duplex				●	●	●	●								3
hyalicosta	●			●	●	●	●	●	●	●					3

Table 1. Distribution of Tabanidae in Canada and in Alaska (*Concluded*)

	Newfoundland	Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Northwest Territories	Yukon	Alaska	Abundance Index
Atylotus (cont'd)															
insuetus								●		●	●		●		5
intermedius							●								1
palus				●	●	●	●								2
sphagnicola	●	●		●	●	●	●								5
sublunaticornis	●					●	●	●	●	●		●		●	3
thoracicus l	●	●		●	●	●	●								4
tingaureus											●			●	2
woodi							●								
Tabanus															
aegrotus											●				1
americanus							●								1
atratus						●	●	●							2
calens							●								2
catenatus			●	●	●	●	●								2
fairchildi							●								1
fratellus										●	●				2
fulvicallus							●	●							1
kesseli											●				2
laticeps											●				1
lineola						●	●								4
limbatinevris							●								1
marginalis				●	●	●	●	●	●	●	●				5
nigripes							●								2
nigrovittatus			●	●	●										3
novaescotiae				●	●	●	●								2
pumilus							●								3
punctifer											●				3
quinquevittatus						●	●								6
reinwardti				●	●	●	●	●	●	●	●				3
sackeni							●								1
sagax							●								1
sequax											●				2
similis				●	●	●	●	●	●		●				7
stonei											●				1
stygius							●								1
subniger							●								1
sulcifrons							●								2
trimaculatus							●								1
vivax	●	●		●	●	●	●	●							2

Methods of collecting and preserving

The most common method of collecting adults of Tabanidae, as in the case of most other flying insects, is the entomological sweep net. Success with this and other methods to be mentioned depends to a great extent on the locality where they are used. Tabanidae, though strong fliers, are normally more abundant near their wetland breeding sites. Hence, collecting for species diversity and number of specimens should be done near these sites. As with many other flying insects, Tabanidae tend to select certain flyways such as the border of a forested area or along ravines or other natural boundaries. Rarely traveled dirt roads through moist forests are productive flyways but only if the forest canopy is moderately open to allow sufficient sunlight to penetrate to the roadway.

Collecting by sweep net is labor-intensive, and therefore various types of stationary traps have been devised. The most widely used and, under normal conditions, the easiest to erect and the most effective is the canopy trap described by Catts (1970). This was derived primarily from a conical trap known as the Manitoba trap, developed by Thorsteinson, Bracken, and Hanec (1965).

The collecting head design is important to trapping effectiveness and to easy retrieval of trapped insects. The head design shown in Fig. 22 of Pechuman (1981) is very practical. In this type, cyanide in the collecting bottle kills flies that reach the clear or opaque funnel above the jar. But a piece of dichlorvos-impregnated insect strip (Vapona®) suspended in the funnel also serves the same purpose.

Dark, shiny surfaces are attractive to female Tabanidae, which explains the reason for the black skirt on the canopy trap. A further attractant is a beach ball painted black and suspended below the canopy. The most effective tabanid attractant yet found is carbon dioxide. The easiest way of handling this gas for use with the canopy trap is in the form of dry ice, which can be placed in a mesh bag and suspended under the canopy.

The biggest shortcoming of these collecting methods is the infrequency of collecting males. Males do not respond to the color and odor attractants that mimic warm-blooded hosts of female flies, and possibly do not fly as much as females. Males are only rarely taken by sweep net or in attractant traps. However, one trap that has consistently yielded more males than any other design is a 6-m-long mesh intercept trap with collecting heads at both ends (Gressitt and Gressitt 1962). The trap is sold commercially and is large enough to span most flyways.

Flies must be in good condition for easy identification. The condition of the surface of the fly, especially the absence of broken appendages and the lack of abrasion (evident as loss of hairs and pruinosity) and discoloration, is usually a measure of the care in collection. Flies caught in sweep net bags should be transferred promptly to killing bottles. The bags should never be used when wet. Killing bottles should be dry and should contain loose paper tissue to cushion and separate insects in their dying movements; the insects should not be overcrowded. To avoid undue crowding, several killing bottles should be used concurrently, if necessary.

Flies should be pinned before undue drying occurs. If a short delay is anticipated, specimens may be kept in fresher condition by placing a leaf of a tree or shrub in the containment vessel to elevate the humidity. Specimens can be frozen and then thawed and pinned several days later, with good results. Freeze-drying of specimens for a prolonged period in an ordinary household freezer can be beneficial to the quality of specimens, especially recently emerged flies that have not had enough time to harden the cuticle naturally.

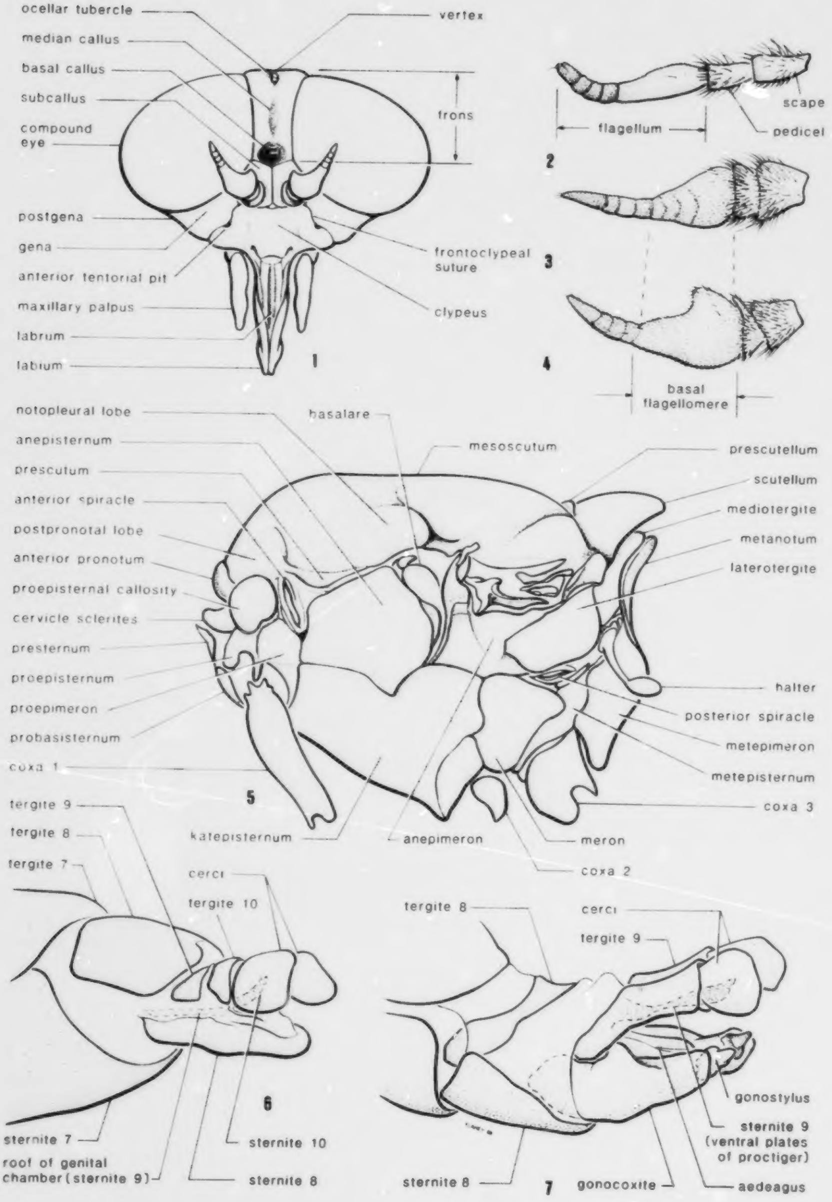
If long delays in emptying trap containers cannot be avoided, it is probably best to collect specimens in 70–80% alcohol. Specimens preserved in such a way can be treated later by immersion in a mixture of equal parts of 70% alcohol and ethyl acetate for at least half a day, followed by immersion in pure ethyl acetate for the same time, and then air-drying on paper towelling (Vockeroth 1966). The specimens should be pinned before the acetate treatment because this causes tissue-hardening, which makes insertion of the pin more difficult and the specimen more likely to loosen on the pin.

Adult morphology

Apart from the common general textbooks on insect morphology such as that of Snodgrass (1935), the only specific sources of information on the external morphology of adult Tabanidae are the papers by Bonhag (1949, 1951) and Bromley (1926). These are the primary reference sources for the description of body parts that follows, although some terminology has been altered to follow the usage proposed by McAlpine (1981).

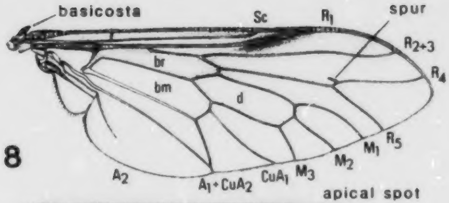
The head (Fig. 1) is dominated by the large compound eyes, especially in males, where the eyes meet medially above the antennae. In males the head is described as being *holoptic*, whereas in females, where the eyes are separated, the head is called *dichoptic*. The eyes comprise numerous *facets*, which are the corneas of individual *ommatidia*. In females the facets are of uniform size. In males of many species the upper median area of the eye is made up of larger facets, which presumably are better adapted for detecting the flight of a female and catching it as a prelude to the mating process. There is great variation among the species in the relative size of these upper facets and the relative area of the eye that they occupy.

The eyes of many live males and females have a distinctive color pattern involving transverse stripes, as in many Tabaninae (Figs. 11–92), and rather intricate curved patterns in *Chrysops* species. These patterns are lost in dried specimens but can usually be recovered by rehydrating the specimen by placing it in a humid atmosphere for several hours.

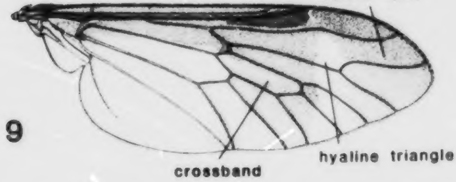

ocellar tubercle
median callus
basal callus
subcallus
compound eye
vertex
frons
postgena
gena
anterior tentorial pit
maxillary palpus
labrum
labium
frontoclypeal suture
clypeus
1
scape
flagellum
pedicel
2
3
4
basal flagellomere
notopleural lobe
anepisternum
prescutum
anterior spiracle
postpronotal lobe
anterior pronotum
proepisternal callosity
cervicle sclerites
presternum
proepisternum
proepimeron
probasisternum
coxa 1
basalare
mesoscutum
prescutellum
scutellum
mediotergite
metanotum
laterotergite
halter
posterior spiracle
metepimeron
metepisternum
coxa 3
5
katepisternum
anepimeron
meron
coxa 2
tergite 9
tergite 8
tergite 7
cerci
tergite 10
sternite 7
roof of genital chamber (sternite 9)
sternite 10
sternite 8
6
tergite 8
cerci
tergite 9
gonostylus
sternite 9 (ventral plates of proctiger)
sternite 8
7
gonocoxite
aedeagus

Figs. 1–7. Morphological features of head (1), antenna (2–4), thorax (5), and female (6) and male (7) terminalia.

8



9



Figs. 8, 9. Wings of Tabanidae showing venational nomenclature (8) and wing pattern features of *Chrysops* (9).

The eyes of females are separated medially by the *frons*, which in most taxonomic literature on Tabanidae is considered to extend from the top of the head, or *vertex*, to the *subcallus* at the lower inner angle of the eye (Fig. 1). The frons often bears areas of glossy integument called the *basal* and *median calli*. However, in cases where only one callus is present, sometimes apparently as a result of the fusion of basal and median calli, the name *frontal callus* is often applied. Ocelli are well-developed in all Pangoniinae and Chrysopsinae but are usually either absent or vestigial in the Tabaninae. Between the frons and antennae is a more or less swollen, medially grooved area called the *subcallus*. This is most often pruinose but in some species is denuded and shiny, like the frontal callus, and is often of a different color than the frons.

The dimensions of the frons are sometimes important diagnostic features of species of some genera. These are indicated by two indices, a width index (height divided by basal width) and a taper index (dorsal width divided by basal width).

The antennae are of major importance in species identification and in the classification of the family. Each antenna consists of three parts, the *scape*, the *pedicel*, and the *flagellum* (Fig. 2). The scape, or basal segment, is most often rather small and not much longer than wide, but in genera such as *Chrysops* and *Haematopota* it may be elongated and distinctly swollen. The pedicel is most often more uniform in size, with the only significant variation being a lengthening, usually in tandem with the lengthening of the scape.

The flagellum primitively consists of 8 segments, or *flagellomeres*, with the first 4 flagellomeres tapered and in some cases partly fused (Fig. 3). Such antennae are characteristic of the Pangoniinae. Various modifications of this arrangement combine a total fusion of the first 4 flagellomeres, here called the *basal flagellomere*. In the case of many species of the Chrysopsinae the scape and pedicel are slender and elongate, and the basal flagellomere is similarly slender (Fig. 2). In almost all Tabaninae the basal flagellomere is the largest segment and is often distinctively swollen dorsally or produced into a blunt, acute, or finger-like dorsal process, creating a shallow to deep dorsal excavation in front of the process (Fig. 4).

Below the antennae between two sublateral *tentorial pits* is the large shield-shaped *clypeus* connected to the proboscis below. Between the clypeus and the eyes are the *genae*, which at the ventral margin of the head between eye and oral cavity is called the *postgena*. The postgena blends imperceptibly into the postcranium or back of the head through which the neck opening, or *occipital foramen*, carries the esophagus and nerve cord into the thorax. Between the occipital foramen and the vertex, or top of the head, is the *median occipital sclerite*.

The *proboscis* of female Tabanidae is composed (from ventral side upward) of the *labium*, a pair of blade-like *maxillae* connected basally to a pair of 2-segmented *maxillary palpi*, the *mandibles* (another pair of thin blades that are serrated at the apex), the *hypopharynx*, and the *labrum*. The proboscis is usually no longer than the height of the head but may be several times that in some exotic species. The labium is the largest element and comprises two parts—the *prementum*, which forms a sheath for the other mouthparts, and an apical pair of lobes called the *labellae*. The labellae vary in size, being usually relatively large and fleshy but small and heavily sclerotized in some exotic species of the Pangoniinae. The only sclerotization of the labellae in the fauna treated here is a narrow subbasal band in species of *Chrysops*.

The mandibles and maxillae are drawn out into slender flattened stylets that are adapted for piercing. These, together with the hypopharynx, an equally long organ through which the salivary duct runs, lie in a groove on the dorsal surface of the labial prementum, which is then covered by the labrum. In the act of blood-sucking, the mandibular and maxillary stylets and the hypopharyx are forced into the skin while the labellae are folded back around the point of puncture, where they are able to contain the blood flowing from the wound and direct it to the food canal.

The maxillary palpus projecting laterally at the base of the proboscis comprises two segments, or *palpomeres*. The first is small and inconspicuous and the second, which has important sensory functions, is larger. The form and color of the second palpmomere are of considerable importance in taxonomic diagnosis. It may be slender to greatly swollen basally, blunt or pointed apically, and with or without grooves or depressions laterally.

Because of their great diagnostic importance, especially in the subfamily Tabaninae, the frons and associated subcallus, antenna, and palpus of all species of *Hybomitra* and *Tabanus* and three species of *Atylotus* are illustrated in Figs. 11–92. In many cases the banding pattern of the eye of male or female, or both, is included. The lettering in these figures, from *a* to *d*, consistently refers to the eye, antenna, palpus, and frons plus subcallus, respectively. The varied density of stippling on the eye, antenna, and palpus is an attempt to show relative depth of color. The same, in a sense, is also the case for the frons and subcallus, except that the stippled areas also represent glossy areas that lack pruinosity.

The *thorax* is composed of 3 segments—*prothorax*, *mesothorax*, and *metathorax*, of which the mesothorax is greatly enlarged to accommodate the muscles for the single functional pair of wings, which are the most characteristic feature of all true flies. Each of these segments is divided into a number of sclerites. The position and shape of these sclerites is uniform among the various species of Tabanidae, and the only features of diagnostic importance here are integumental and hair color differences on certain of these sclerites; it is only necessary to refer to Fig. 5, where the sclerites are named, to interpret the differences.

The appendages of the thorax, namely legs and wings, are also uniform in shape and venation. The legs, comprising the usual segments of *coxae*, *trochanter*, *femur*, *tibia*, and 5 *tarsomeres*, are slender, and they vary in color of integument and hairs. The mid tibia always has a pair of apicoventral spurs; the hind tibiae of Pangoniinae and Chrysopsinae have similar spurs, which are absent in Tabaninae. There is sometimes a difference in length and curvature of the 2 tarsal claws of the prothoracic leg.

The wing venation is shown in Fig. 8. Vein notations traditionally begin with a capital letter and cells with a lowercase letter. Cells of the wing have the same letters and number as the vein preceding it, except for the three interior cells noted. The venational pattern is quite uniform among the species under consideration here. The only variation is the narrowing or closure of cell r_5 at the wing margin and the presence of a spur vein projecting near the base of R_4 in some species.

The wing membrane may be variously darkened, or *infuscated*. Such infuscation provides valuable diagnostic features. This feature is especially useful in the genus *Chrysops*; Fig. 9 shows a typical example and the nomenclature used in describing the pattern. The presence or absence of the apical spot and its width, the extent of the hyaline triangle and crossband, and the portion of cells br and bm covered by the infuscation are important diagnostic features. The wing of *Goniops* is darkened along the leading edge (Fig. 10). The wing of *Haematopota* (Figs. 137–139) is typically extensively infuscated with patterns of spots or rosettes. Several species of Tabaninae have one or more of the costal cell and the margins of veins, vein bifurcations, and crossveins infuscated.

The abdomen of most Tabanidae is as broad as the thorax, wider than thick, nearly parallel-sided, broadly rounded posteriorly, and usually with 6 or 7 of the 8 unmodified segments and sometimes part of the terminalia visible. Each segment comprises a dorsal *tergite* and a ventral *sternite* that overlap the following segment, with the tergites laterally slightly reflexed ventrally to overlap the corresponding sternite so that no intersegmental membrane is visible. Sternites 1 and 2, however, are fused.

Segments beyond the seventh are collectively called the *terminalia*. These structures in both male and female show, at most, minor specific differences, but at generic and in particular at higher taxonomic levels they have been especially useful in showing relationships (Mackerras 1954, 1955*a*, 1955*b*).

In the female terminalia (Fig. 6) tergites 8–10 are much smaller than the preceding tergites; tergite 8, the largest of the three, is always undivided. Tergite 9 is represented by a narrow transverse sclerite in most Pangoniinae, or it is split medially to form triangular lateral sclerites in species of Chrysopsinae and Tabaninae. Tergite 10 is also nearly always divided and bears a pair of terminal, 1-segmented *cerci*. Sternite 8, a large, rather shield-shaped sclerite, covers much of the ventral surface of the terminalia. Posterior to it is the small sternite 10, lying below and anterior to the cerci. Between sternite 8 and sternites 9 and 10 is a deep genital chamber, the roof of which, although mostly membranous, comprises in part sternite 9. The spermathecal duct opening is in sternite 9, and the vagina opens slightly anteriorly in the intersegmental membrane between sternites 8 and 9.

The male terminalia (Fig. 7) dorsally is quite similar to that of the female, which has a narrow transverse tergite 8 and a large subquadrate shield-like tergite 9 in all Pangoniinae, but which is divided medially into two parts in Chrysopsinae and Tabaninae. Tergite 10 is either absent or indistinguishably fused with tergite 9. Cerci, similar to those of females, are appended apically. Ventrally, sternite 8 is large and entire, whereas sternite 9 is indistinguishably fused with the clasping organs or *gonopods*, each comprising a basal *gonocoxite* and an apical *gonostylus*.

The gonostylus is typically single or bifid in Pangoniinae, more or less pointed in Chrysopsinae, and characteristically truncate in Pangoniinae. The *aedeagus* in all subfamilies is enclosed within the tapered *aedeagal sheath* lying between the two gonocoxites.

Despite the importance of differences in genitalia in showing ancestral relationships, the differences are impractical for use in routine identification and unnecessary in dealing with the fauna treated herein.

Classification of Tabanidae

The present classification of the Tabanidae, now generally accepted among students of the family, was proposed by Mackerras (1954, 1955*a*, 1955*b*). The classification is based mainly on the terminalia of both male and female, but there is good correlation with external characters and with the little that is known of the larvae and pupae.

The major categories of the classification are listed in Table 2. Mackerras originally proposed a fourth subfamily, the Scepsidinae, based on three genera inhabiting coastal sand beaches in Africa and South America, but this subfamily has been relegated by most workers to tribal rank under Pangoniinae. A census of genera and species in the various suprageneric taxa is presented in Table 2, to give the reader some idea of how Canada stands in relation to the North American and world fauna. The census of the world fauna is taken from the only world catalog of Tabanidae, by Moucha (1976). Information on the North American fauna is from Philip (1965), including subsequent modifications, and the data for the Canadian fauna are as treated herein.

Table 2. Census of Tabanidae

	Genera			Species		
	World	North America	Canada	World	North America	Canada
Pangoniinae						
Pangoniini	27	6	3	179	23	5
Scionini	16	1	1	241	1	1
Philolichini	10			100		
Scepsidini	3			9		
Chrysopsinae						
Chrysopsini	15	8	2	297	88	45
Bouvieromyiini	19	1	1	135	2	1
Rhinomyzini	12			64		
Tabaninae						
Diachlorini	78	7		961	17	
Haematopotini	4	1	1	390	5	3
Tabanini	17	7	3	1363	172	89
Total	201	31	11	3739	308	144

Key to subfamilies and genera

1. **Hind tibia with apical spurs (these spurs quite small in some specimens of *Merycomyia* 2**
   Hind tibia without apical spurs ....TABANINAE 7

2. Flagellum composed of an elongate usually slender basal flagellomere and no more than 4 short apical flagellomeres (Fig. 2) .... CHRYSOPSINAE 5

   Flagellum divided into 7 or 8 flagellomeres (Fig. 3) .... PANGONIINAE 3

3. Eye of female with upper inner angle acute and with width of eye narrower than that of frons. Wing in both sexes distinctively darkened anteriorly (Fig. 10). Head narrower than thorax .... ***Goniops*** **Aldrich** (p. 40)

   one species, *G. chrysocoma* (Osten Sacken); southern Ontario.

   Eye and wing without above combination of characters. Width of head and thorax nearly equal 4

4. Proboscis slender, at least two-thirds as long as height of head; palpus conspicuously shorter than proboscis. Ventral surface of scutellum with transverse row of black setae. Spur vein absent on base of R_4 .... ***Stonemyia*** **Brennan** (p. 33)

   Proboscis stout and about half height of head, with large fleshy labella; palpus nearly same length as proboscis. Ventral surface of scutellum without rows of black setae. Usually a strong spur vein basally on R_4 (southern British Columbia) .... ***Apatolestes*** **Williston** (p. 31)

5. Flagellum composed of a rather broad basal flagellomere and 2 or 3 apical flagellomeres; scape only slightly longer than wide. Total length of antenna equal to or shorter than head. Hind tibial spurs very small. Length near 15 mm .... ***Merycomyia*** **Hine** (p. 41)

   one species, *M. whitneyi* (Johnson); eastern.

   Flagellum with a rather narrow basal flagellomere and 4 apical flagellomeres; scape at least twice as long as wide; total length of antenna longer than head (Fig. 2). Hind tibial spurs pronounced. Length near 12 mm 6

6. Wing hyaline or with isolated dark spots on veins, rarely rather evenly infuscated. Pedicel only about half the length of scape; if subequal, flagellum shorter than scape. Subgena pruinose .... ***Silvius*** **Meigen** (p. 43)

   one species, S. *gigantulus* (Loew); western.

   Wing with at least a dark crossband (Figs. 9, 93–136). Scape or pedicel, or both, subequal (Fig. 2). Subgena partly to extensively glossy .... ***Chrysops*** **Meigen** (p. 44)

7. Scape considerably longer than wide. Wing pattern composed of gray and white maculations (Figs. 137–139) .... ***Haematopota*** **Meigen** (p. 135)

Scape barely longer than wide. Wing markings, if present, other than above 8

8. Vertex with a distinct glossy to subglossy ocellar tubercle in female and with an elevated, anteriorly glossy tubercle in male. Eye usually hairy. Vein Cu with one or more setae dorsally . . . . ***Hybomitra*** **Enderlein** (p. 140)

Vertex without an ocellar tubercle; if elevated tubercle present in male, tubercle completely pruinose. Vein Cu bare dorsally 9

9. Frons of female with frontal calli absent or reduced to 1 or 2 small oval spots well separated from eyes (Figs. 58–60). Eye hairy, often yellow or pale brown in dried specimens . . . . ***Atylotus*** **Osten Sacken** (p. 252)

Frons with a broad basal callus (Figs. 61–92). Eye sparsely hairy or bare, blackish in dried specimens . . . . ***Tabanus*** **Linnaeus** (p. 281)

Tableau d'identification des sous-familles et des genres

1. Tibia postérieur pourvu d'éperons apicaux (tout petits chez certains *Merycomyia*) 2

Tibia postérieur dépourvu d'éperons apicaux . . . TABANINAE 7

2. Flagelle constitué d'un article basal mince généralement oblong, habituellement mince et de pas plus de 4 articles apicaux (fig. 2) . . . . CHRYSOPSINAE 5

Flagelle constitué de 7 ou 8 articles (fig. 3) . . . . PANGONIINAE 3

3. Oeil de la femelle à angle supérieur interne aigu plus étroit que le front. Chez les deux sexes, partie antérieure de l'aile nettement foncée (fig. 10). Tête plus étroite que le thorax . . . . ***Goniops*** **Aldrich** (p. 40)

une espèce, ***G. chrysocoma*** (Osten Sacken); sud de l'Ontario.

Oeil et aile dépourvus de la combinaison précitée de caractères. Tête et thorax presque de la même largeur 4

4. Trompe mince, dont la longueur atteint les deux tiers de la hauteur de la tête; palpe visiblement plus court que la trompe. Face ventrale du scutellum ornée de rangées transversales de soies noires. Pas de nervure basale acuminée sur R_4 . . . . ***Stonemyia*** **Brennan** (p. 33)

Trompe épaisse, d'une longueur représentant la moitié de la hauteur de la tête, pourvue de gros labelles charnus; palpe presque aussi long que la trompe. Face ventrale du scutellum sans rangée de soies noires. Habituellement, nervure acuminée prononcée sur la partie basale de R_4 (sud de la Colombie-Britannique) .... ***Apatolestes*** **Williston** (p. 31)

5. Flagelle constitué d'un article basal plutôt large et de 2 ou 3 articles apicaux; scape à peine plus long que large. Longueur totale de l'antenne pas plus grande que celle de la tête. Éperons du tibia postérieur minuscules. Longueur : près de 15 mm .... ***Merycomyia*** **Hine** (p. 41)

une espèce, *M. whitneyi* (Johnson), dans l'Est.

Flagelle constitué d'un article basal plutôt étroit et de 4 articles apicaux; scape au moins deux fois plus long que large; longueur totale de l'antenne supérieure à celle de la tête (fig. 2). Éperons du tibia postérieur accentués. Longueur : près de 12 mm 6

6. Aile transparente ou portant des taches foncées, isolées sur les nervures, rarement à pigmentation brunâtre également répartie. Pédicelle deux fois plus court que le scape; si presque égal, flagelle plus court que le scape. Bande subgénale pruineuse .... ***Silvius*** **Meigen** (p. 43)

une espèce, *S. gigantulus* (Loew), dans l'Ouest.

Aile portant au moins une bande transversale foncée (fig. 9, 93 à 136); scape, pédicelle ou les deux presque de même longueur (fig. 2); et bande subgénale partiellement ou totalement lustrée . ... ***Chrysops*** **Meigen** (p. 44)

7. Scape considérablement plus long que large. Motif des mouchetures alaires constitué de gris et de blanc (fig. 137 à 139) .... ***Haematopota*** **Meigen** (p. 135)

Scape à peine plus long que large. Si présentes, marques alaires différant des précédentes 8

8. Sur le vertex de la femelle, ocelles formant un tubercule distinct, lustré ou presque; chez le mâle, tubercule proéminent, lustré sur sa partie antérieure. Oeil habituellement velu. Face dorsale de la nervure Cu dotée d'au moins une soie .... ***Hybomitra*** **Enderlein** (p. 140)

Vertex dépourvu de tubercule. Si le mâle possède un tubercule proéminent, ce dernier est complètement pruineux. Face dorsale de la nervure Cu glabre 9

9. Calus frontaux absents chez la femelle ou réduits à 1 ou 2 petites taches ovales bien distinctes des yeux (fig. 58 à 60). Oeil velu, souvent jaune ou brun pâle chez les spécimens desséchés .... ***Atylotus*** **Osten Sacken** (p. 252)

Calus inférieur du front large (fig. 61 à 92). Oeil glabre ou à pilosité clairsemée, noirâtre chez les spécimens desséchés .... ***Tabanus*** **Linné** (p. 281)

Subfamily Pangoniinae

Antenna little if at all longer than head length; scape and pedicel short and usually with 8 tapered but otherwise unmodified flagellomeres (Fig. 3). Eye bare; ocelli well developed. Hind tibia with paired apical spurs. Wing with basicosta pruinose, without setae. Ninth abdominal tergite undivided, forming large chitinized shield in male and transverse bar in female. Gonostylus of male terminalia pointed or bifid apically. Caudal ends of spermathecal ducts in female forming simple tubes without mushroom-like expansions.

Genus *Apatolestes* Williston

Medium-sized. Frons strongly convergent above, pruinose to extensively glossy, sometimes with swollen basal callus. Eye bare; ocelli well developed. Antenna with scape equal to or slightly wider than basal flagellomere; 8 flagellomeres, tapered apically. Proboscis short and stout; labellae large, soft; apical palpomere swollen basally, with dorsal groove. Wing with costal cell and crossveins sometimes darkened, and fork of R_{4+5} with spur vein. Abdomen longer than broad, about as wide as thorax.

Remarks. Eleven species of *Apatolestes* have been described in western North America of which three have been reported in British Columbia; Philip (1965) has reported *A. comastes* Will. and *A. willistoni* Brennan, and Pechuman (1957) has reported *A. villosulus* (Bigot). Dr. Pechuman (in litt.) considers his identification of *A. villosulus* to be an inexplicable error, as the species has not previously been reported north of California.

Only three specimens of the genus collected in British Columbia have been located, a male and two females in the Cornell University collection, all collected at Robson, B.C., by H.R. Foxlee over a span of 10 years; collection dates ranging from late July to early September. The specimens do not fit exactly the descriptions of any described species but come closest to the *A. comastes* group, which includes *A. willistoni* and its variety *A. fulvipes* Philip. Turner (1985) and Nowierski and Gittins (1976) have recorded *A. comastes* and *A. willistoni* in the adjoining states of Washington and Idaho. The variation affects only the two females, which exhibit a considerable amount of brownish coloration of the frons, the face, and portions of the integument of the thorax and abdomen, the coloration resembling the condition in the variety *A. fulvipes*. The male is more typical of *A. willistoni*, with a more solid black integument and extensive black hairs.

The genus *Apatolestes* is in need of a thorough revision.

Key to species of *Apatolestes*

1. Head and thorax almost entirely white-haired; costal cell hyaline or very weakly infuscated .... ***comastes*** **Williston** (p. 32)

Gena, palpus, thoracic anepisternum, and notopleural lobes with rather conspicuous black hairs; costal cell infuscated .... ***willistoni*** **Brennan** (p. 33)

Tableau d'identification des espèces d'*Apatolestes*

1. Pilosité de la tête et du thorax presque entièrement blanche; cellule costale transparente ou très faiblement brunâtre .... ***comastes*** **Williston** (p. 32)

Poils noirs, plutôt visibles, sur les joues, le palpe, l'anépisternum thoracique et les lobes du notopleurite; cellule costale brunâtre .. .. ***willistoni*** **Brennan** (p. 33)

Apatolestes comastes Williston

Apatolestes comastes Williston, 1885:12.

Female. Length 8–11 mm long. Grayish black. Frons 1.2 times as tall as basal width, predominantly shiny black, with ocellar area sparsely whitish pruinose and sides dorsally, next to eyes, narrowly brown pruinose; ventral part of frons transversely swollen, glabrous, with haired concavity above. Subcallus, clypeus, and gena whitish pruinose; clypeus and gena mostly white-haired; gena with sparse black hair. Antenna white-haired; scape and pedicel white pruinose; flagellum black. Palpus whitish pruinose, with white hair.

Thorax almost exclusively white-haired; scutum with median, submedian, and lateral longitudinal stripes that are narrow, white, and pruinose; pleural sclerites white pruinose. Legs with coxae and femora grayish black and mostly white-haired; tibiae and tarsi brown and mostly black-haired. Wing hyaline; fork of R_{4+5} and crossveins sometimes faintly infuscated; fork of R_5 with strong spur vein.

Abdomen with caudal margins of tergites and sternites narrowly whitish pruinose and white-haired; anterior darker part of tergites black-haired. Sternites predominantly white-haired.

Male. Similar to female.

Apatolestes willistoni Brennan

Apatolestes willistoni Brennan, 1935:373 (as var. of *comastes*).

Female. Length 10–12 mm. Grayish black. Frons 1.2 times as tall as basal width, black, mostly glossy; lower margin of basal callus transversely swollen, glabrous; remainder of frons haired, with white hair below ocelli and black hair to vertex. Antenna with scape and pedicel white pruinose; flagellum black. Basal callus, clypeus, and genae white pruinose, white-haired; genae usually with sparse black hair. Palpus pale yellowish, white-haired, with a few black hairs.

Thorax blackish, mainly white-haired; mesanepisternum and notopleural lobes with some black hair; scutum with longitudinal pruinose stripes. Legs brown to black; femora often darker, mostly black-haired, except mid and hind femora and all coxae white-haired. Wing with costal cell at least faintly infuscated; fork of R_{4+5} with long spur vein.

Abdomen blackish; segments with posterior margins narrowly yellowish; tergites more widely whitish pruinose posteriorly, with white hair posteriorly and black hair anteriorly. Sternites only white-haired.

Male. Similar to female.

Genus *Stonemyia* Brennan

Length 9–16 mm. Frons nearly parallel-sided to moderately widened below, pruinose, sparsely haired, without evident calli. Antenna with scape and pedicel short; flagellum of 8 rather uniformly tapered flagellomeres. Proboscis short; labellae fleshy; second palpomere slender, tapered, and slightly elbowed basally. Clypeus prominently outlined by deep furrow of frontoclypeal suture. Thorax gray to nearly black, sometimes with paler stripes, and equal to or slightly narrower and shorter than suboval abdomen; scutellum with transverse rows of black and yellow setae ventrally. Abdominal tergites black, with transverse posterior yellow bands usually widening laterally on anterior tergites.

Remarks. The five species and one subspecies representing this genus are confined to North America. One of these species, *S. californicus* (Bigot), was recently transferred to *Stonemyia* by Burger (1985). Four of the taxa have been found in Canada.

Almost nothing is known of the biology of this genus. Both sexes of several species have been found on flowers and resting on the ground in openings in wooded areas. There is no evidence of their taking a blood meal.

Key to species of *Stonemyia*

1. Legs yellow or brown 2
   Legs black 3
2. Body length 14–15 mm. Pale body hairs yellow. Male eye hairy (southern British Columbia) .... ***californica* Bigot** (p. 35)
   Body length no more than 13 mm. Pale body hairs off-white to white. Male eye bare (Ontario and Quebec) .... ***rasa* Loew** (p. 38)
3. Hairs of thorax (including coxae and femora) and head (except antennae and palps) almost entirely off-white to pale yellow; notopleural lobes and clypeus occasionally with a few black hairs (eastern Canada) .... ***tranquilla* Osten Sacken** (p. 39)
   Abundant black hairs on some or all of femora, upper anepisternum, notopleural lobe, scutum, clypeus, frons, and occipital margin; paler hairs bright yellow (British Columbia) .... ***fera* Williston** (p. 36)

Tableau d'identification des espèces du genre *Stonemyia*

1. Pattes jaunes ou brunes 2
   Pattes noires 3
2. Longueur du corps : 14 à 15 mm. Pilosité du corps jaune lorsqu'elle est pâle. Oeil du mâle velu (sud de la Colombie-Britannique) .... ***californica* Bigot** (p. 35)
   Longueur du corps : pas plus de 13 mm. Pilosité du corps blanc coquille à blanche lorsqu'elle est pâle. Oeil du mâle glabre (Ontario et Québec) .... ***rasa* Loew** (p. 38)
3. Poils du thorax (y compris des hanches et des fémurs) ainsi que de la tête (sauf des antennes et des palpes) presque entièrement

blanc coquille à jaune pâle; lobes du notopleurite et clypeus portant parfois quelques poils noirs (est du Canada) .... ***tranquilla*** **Osten Sacken** (p. 39)

Poils noirs abondants sur quelques fémurs ou tous, le haut de l'anépisternum, le lobe du notopleurite, le scutum, le clypéus, le front et la marge occipitale; poils pâles jaune vif Colombie-Britannique) .... ***fera*** **Williston** (p. 36)

Stonemyia californica (Bigot)

Map 1

Pangonia dives Williston, 1887:130 (preocc.).
Diatomineura californica Bigot, 1892:618.
Stonemyia (*Pilimas*) *californica* (Bigot); Brennan, 1935:367.

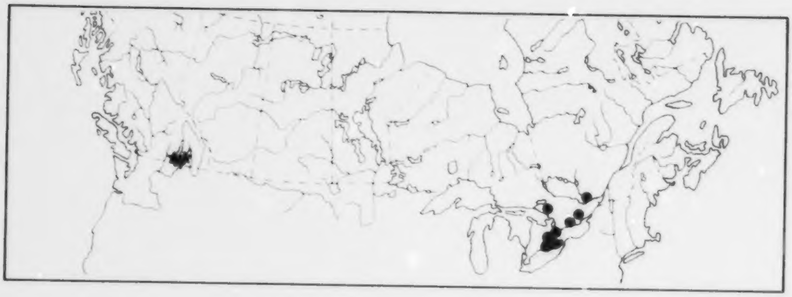
Female. Length 13–17 mm. Eye bare; postocular fringe of setae yellow. Frons moderately narrowed above, without denuded calli. Clypeus and gena yellowish gray pruinose; antenna with scape and pedicel yellow; basal 4 flagellomeres expanded, more or less fused, and individually almost indistinguishable. Apical palpomere slender, orange, black-haired, shorter than proboscis; proboscis about two-thirds height of head.

Thorax grayish with yellow hair. Legs orange brown, slightly darkened apically. Wing with costal cell usually yellowed; base of R_4 with short spur vein.

Abdomen with first 2 or 3 tergites orange; anteromedian area black: remaining tergites and sternites predominantly grayish black; posterior margins yellowish pruinose; all tergites and sternites appearing banded as a result of black hair anteriorly and yellow hair posteriorly.

Male. Similar to female except for pilose eye; upper large-faceted and lower small-faceted areas lacking sharp differentiation.

Distribution. This species reaches its northern limit in the Okanagan Valley of southern British Columbia (Map 1). Its range extends south along mountain chains to Utah and northern Baja California, avoiding the dry, central plateau. Collections have been made from early July to mid August in British Columbia.



Map 1. Collection localities of *Stonemyia californica* (★) and *S. rasa* (●).

Stonemyia fera (Williston)

Map 2

Pangonia fera Williston, 1887:130.
Pangonia tranquilla ssp. *fera* (Williston) of authors.
Stonemyia fera (Williston); Brennan, 1935:361.

Female. Length 11–12.5 mm. Frons, clypeus, and gena brownish to gray pruinose, with black and yellowish hair; frons nearly parallel-sided; postocular fringe of hairs black and yellow to completely black. Antenna black with black hairs. Proboscis usually longer than head height. Palpus slender, grayish to brown, black-haired.

Thorax blackish, with indistinct scutal stripes; predominantly yellow-haired, with some black hair laterally on notopleuron and anepisternum; scutellum black dorsally, with gray pruinose margin. Legs black; coxae and femora with black and yellow hair; legs black-haired elsewhere. Wing with costal cell yellowed; radial cells more lightly infuscated; base of cell r_2 hyaline. Halter dark brown.

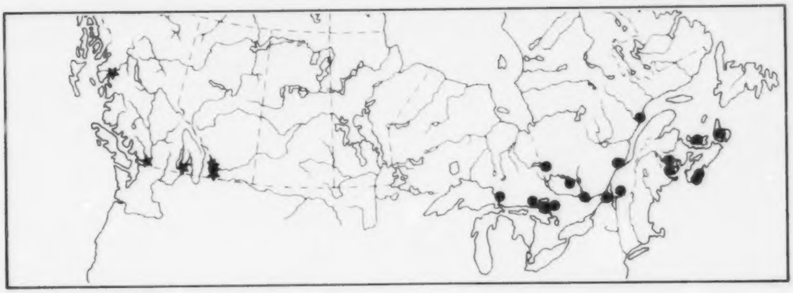
Abdomen black except narrow posterior margins of all tergites and sternites; sides of tergite 2 and often of tergite 3 and much of sternites 1 and 2 orange; tergites and sternites with black areas predominantly black-haired and orange to gray areas mainly yellow-haired.

Male. Similar to female except body hair generally longer, with more black hair, especially on scutum.

Remarks. *Stonemyia fera* was treated as a subspecies of *S. tranquilla* Osten Sacken by Philip (1965). However, I prefer to treat them as a separate species because of the consistent, easily recognized differences outlined in the key and the wide geographical separation of the two.

Adults have been collected on scorpion weed (*Phacelia leptosepala*).

Distribution. The species is found from California to British Columbia and Alberta, the last two locations shown in Map 2. Collections were made from mid June to the end of July.



Map 2. Collection localities of *Stonemyia fera* (★) and *S. tranquilla* (●).

Stonemyia rasa (Loew)

Map 1

Pangonia rasa Loew, 1869:5.
Stonemyia rasa (Loew); Brennan, 1935:363.

Female. Length 11–13 mm. Frons, clypeus, and gena whitish pruinose with brownish undertone, white-haired, except for some black hairs medially on clypeus; frons nearly parallel-sided; postocular fringe of hairs predominantly white. Antenna more or less orange to black; flagellum darkest. Palpus slender, brownish; apical palpomere about half the length of proboscis and about as long as head height.

Thorax gray; scutum nearly black medially, with faint median and sublateral brownish stripes; sides of scutum and pleura grayish pruinose; scutellum black dorsally, grayish on posterior margin; entire thorax white-haired. Legs orange; coxae and femora mainly white-haired; tibiae and tarsi black-haired. Halter brown. Wing hyaline.

Abdomen dark brown to black, with transverse gray to yellow posterior bands widening laterally, especially on anterior tergites and sometimes expanded to form median triangles; median triangles and lateral margins of tergites and sternites white-haired; tergites otherwise black-haired. Sternites 1 and 2 completely white-haired and remaining sternites with preapical areas white and black-haired.

Male. Similar to female except for absence of scutal stripes; hair of scutum substantially black, with pale hair restricted to lateral and anterior margins; mid and hind femora black-haired; abdominal tergites, or only tergite 2, darkened medially, with orange tones laterally and with reduced emphasis of white hairs and pruinosity posteriorly.

Distribution. This species has been reported from Wisconsin to New Brunswick and south to Georgia (Pechuman, Webb, and Teskey 1983). Philip (1965) recorded the species in New Brunswick, but neither Lewis and Bennett (1977) nor I have been able to confirm the New Brunswick distribution. The species appears to prefer lowlands, in Canada occurring in the Ottawa River Valley, along Lake Ontario, and in southern Ontario (Map 1); in neighboring New York the species is notably absent in the Adirondack and Catskill mountain areas (Pechuman 1981). The species' flight season is rather late, from late July to September.

Stonemyia tranquilla (Osten Sacken)

Map 2

Pangonia tranquilla Osten Sacken, 1875:367.
Stonemyia tranquilla (Osten Sacken); Brennan, 1935:365.

Female. Length 11–13 mm. Frons, clypeus, and gena brownish gray pruinose, with white to yellow hair; frons parallel-sided to slightly narrowed above; postocular setae mainly yellow. Antenna with scape and pedicel grayish pruinose; setae black and yellow; flagellum dark brown to black. Proboscis about as long as head height. Palpus about half length of proboscis; apical palpomere slender, grayish basally, orange distally, predominantly black-haired.

Thorax with scutum grayish pruinose, faintly striped, and together with pleura, coxae, and femora nearly completely white to yellow-haired; scutellum brownish black on disk. Legs brownish black. Wing with costal cell and apices of cells r_1 and r_2 beyond stigma yellowed. Halter dark brown.

Abdomen with sternites 1 and 2 and progressively smaller portions of sides of tergites 2–3 or 4 orange; remainder of abdomen black, except posterior margins of tergites and sternites narrowly yellowish to orange; tergites, additionally, with grayish pruinosity and white hair on posterior third, which, contrasting with black hair on black anterior integument of tergites 3–6, producing distinct banded appearance; tergite 2 with black median spot partly to completely yellow-haired.

Male. Similar to female except as follows: Apical palpomere partly to completely yellow-haired; scutum with longer yellowish hair; abdomen with about equal amounts of tergites 2 and 3 orange laterally; hairs on anterior dark portions of tergites and sternites mostly or entirely yellow.

Remarks. This species, differing from *S. rasa*, seems to prefer rocky hills and mountains. It is commonly found on flowers of *Spiraea latifolia*. The larva is undescribed. However, a larva in my possession that was found in the soil of a hemlock nursery in eastern New York is almost certainly of this genus and most likely this species.

Distribution. *Stonemyia tranquilla* is found in Canada in the Laurentian Highlands (Map 2) and extends south along the Appalachians to Georgia. Collection dates range from mid July to late August.

Genus *Goniops* Aldrich

This genus has only one species.

Goniops chrysocoma (Osten Sacken)

Fig. 10

Pangonia chrysocoma Osten Sacken, 1875:368.
Goniops hippoboscoides Aldrich, 1892:237.
Goniops chrysocoma Osten Sacken; Hine, 1900:392.

Female. Length 12–14 mm. Yellowish, stout-bodied, with short pale hairs. Head two-thirds width of thorax. Eye bare, small, and narrow, acutely angled dorsally; ocelli well-developed. Frons as broad basally as tall, strongly narrowed above, wider than eye; frons with large median triangular yellow glossy area. Antenna small, with scape and pedicel short; flagellum indistinctly 8-segmented. Proboscis short.

Thorax and abdomen each as wide as long, unpatterned. Hind tibia with apical spurs. Wing with distinctive pattern of infuscation (Fig. 10), including a clear spot in cell bm below fork of M.

Male. Similar to female except as follows: Head holoptic, upper angle of eye about 90°; thorax and abdomen mainly dark brown dorsally; abdomen with hind margins of tergites yellow; hairs of antenna, palpus, gena, notopleura, mesanepisternum, and legs partly or entirely black, otherwise as in female.

Remarks. The characteristic wing pattern (Fig. 10), present on both sexes, is diagnostic of the species.

Walton (1908) and McAtee (1911) have described the biology and behavior of this species. The eggs are laid on the underside of leaves in damp forests. The female remains over the eggs for at least part of their incubation period, emitting a loud buzzing noise when disturbed. The emerging larvae fall to the forest floor and burrow in the decaying leaves and other vegetative debris. The larvae are apparently predacious, and full growth is achieved in about a year.

Distribution. The species' Canadian distribution is apparently largely restricted to the Niagara Peninsula of Ontario, where it has been rarely collected. There is one other record from London, Ont. It is widespread throughout the eastern United States from New York to South Carolina and Louisiana. Collections were made in mid July.

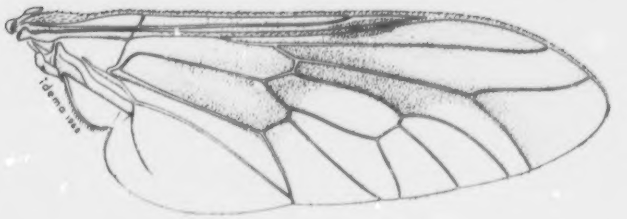


Fig. 10. Wing of *Goniops chrysocoma*.

Subfamily Chrysopsinae

Antennae often slender, with one or both of scape and pedicel longer than wide; flagellum with no more than 5 articulated segments; first flagellomere the largest, apparently comprising 4 fused basal flagellomeres. Basal callus usually present. Ocelli well-developed. Hind tibia with paired apical spurs. Basicosta lacking setae. Ninth abdominal tergite divided, forming a pair of large characteristically shaped plates in the male and small widely separated triangular plates in the female.

Genus *Merycomyia* Hine

Large specimens, resembling some *Tabanus*. Antenna small, with scape and pedicel short but broader than flagellum; flagellum tapered, comprising composite basal flagellomere and 2 or 3 apical flagellomeres. Eye bare; ocelli well-developed. Clypeus recessed below level of genae. Hind tibia with small apical spurs. Wing darkened anteriorly, with centre of cells subhyaline. Abdomen with tergites 4 and 5 having large pale areas.

The genus is the only representative of the tribe Bouvieromyiini in North America and comprises only two species. Adults of the genus have a different appearance from those of other North American genera because of the large specimen size, the short antennae with enlarged scape, and the presence of small hind tibial spurs that are easily overlooked.

Pechuman (1964) greatly simplified the systematics of the genus by recognizing that several species were synonymous with others and thus recognizing only two species, only one of which occurs in Canada.

Merycomyia whitneyi (Johnson)

Map 3

Tabanus whitneyi Johnson, 1904:15.
Merycomyia geminata Hine, 1912:515.

Female. Length 19–23 mm. Head narrower than thorax. Eye bare. Frons brown, about three times as tall as basal width, narrowed above; ocelli well-developed; basal callus lanceolate, broadest ventrally, tapered dorsally to point at anterior ocellus. Antenna brown; basal flagellomere slightly longer than broad, evenly tapered; only 2 or 3 short, terminal flagellomeres. Palpus brown, pale-haired; terminal palpal segment broadest basally, curved and tapered apically, about 2.5 times as long as broad. Proboscis short.

Thorax brownish; scutum with median, submedian, and sublateral grayish stripes. Pleura and coxae with light grayish pruinosity; remainder of leg segments orange brown, lacking pruinosity. Halter orange brown, with the knob darker. Wing with basicosta bare; wing membrane yellowish brown, with only centre of cells hyaline.

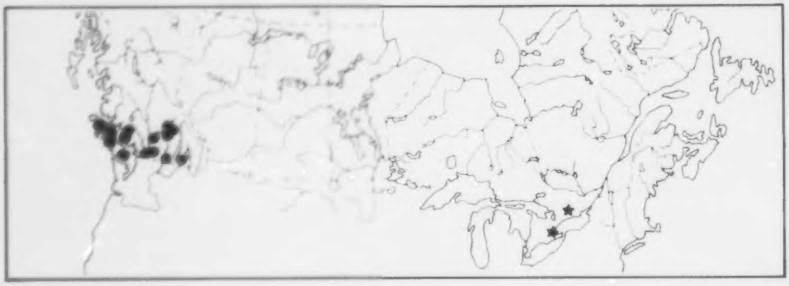
Abdomen black to dark brown, with large submedian whitish pruinose patches extending over tergites 4 to 5 or 6; sternites lightly gray pruinose, yellow-haired.

Male. Similar to female except body coloring generally darker, with black and brown hairs on both surfaces of abdomen; wing coloring paler, with margins of apical veins lightly or not at all infuscated.

Remarks. Larvae were collected and reared from a stream near Gilmour, Ont. (Teskey 1969), and subsequently from Lebanon State Forest, N.J., and Carabelle, Fla. Collection sites were all very similar—thick flocculent deposits of silt that had accumulated in backwater areas protected from the current of the streams. Pechuman (1964) commented on the high frequency of rearing of this species compared with the number of field-collected adults, indicating the obscure habits of the adults.

Distribution. *Merycomyia whitneyi* has been collected from only two localities in Canada, Gilmour and Hamilton, Ont. (Map 3). These collections appear to be disjunct from the main range of the species, which extends along the Atlantic lowlands from Maine to Florida, with a western and northern curve around the Appalachians to Indiana.

The Ontario adults were collected on 20 July and 4 August.



Map 3. Collection localities of *Silvius gigantulus* (●) and *Merycomyia whitneyi* (★).

Genus *Silvius* Meigen

Medium to small flies. Eye bare, in life irregularly speckled. Antenna slender; scape at least twice as long as wide; pedicel sometimes lengthened. Apical palpomere curved and moderately tapered, flattened, or depressed laterally. Proboscis shorter than head height. Gena and subgena pruinose. Wing hyaline or with restricted darkening of crossveins and furcation of veins.

Nine species of the genus have been recognized in North America; all are confined to the western half of the continent, and only a single species occurs in Canada.

Silvius gigantulus (Loew)

Map 3

Chrysops gigantulus Loew, 1872:57
Silvius trifolium Osten Sacken, 1875:395
Silvius gigantulus: Osten Sacken, 1877:215.

Female. Length 10–12 mm, with yellowish gray thorax and orange abdomen. Head with frons, clypeus, and genae predominantly yellowish gray pruinose, white-haired except some black hair on upper margin of genae. Frons about 1.3 times as tall as basal width, slightly widened below, with subtriangular denuded dark brown basal callus about half to two-thirds width of frons; ocelli well-developed. Clypeus with lateral margins broadly denuded and shiny. Antenna slender with scape and pedicel yellowish; basal flagellomere orange and apical flagellomeres black; scape about twice as long as wide; pedicel half the length of scape; flagellum longer than scape and pedicel, comprising a basal flagellomere about as long as 4 terminal flagellomeres. Palpus orange, moderately flattened.

Thorax completely yellowish, white-haired. Legs yellowish orange, with apex of tibiae and tarsi moderately darkened; coxae and mid and hind femora predominantly pale-haired; fore femur, tibiae, and tarsi predominantly black-haired. Wing hyaline, except for moderate yellowing of costal cell; base of R_4 with spur vein. Halter yellow.

Abdomen orange, usually with first tergite below scutellum and small median oval patch on tergite 2 blackened; tergites and sternites black-haired, except for indistinct clusters of whitish hairs laterally and usually medially on posterior margins.

Male. Very similar to female; eye with upper facets distinctly enlarged; apical palpomere short, cylindrical, long-haired on all sides; thoracic hairs longer.

Distribution. This species is to be found from southern British Columbia (Map 3) to Washington, Idaho, western Montana, Oregon, California, and Baja California. Collection dates of the specimens from British Columbia range from late June to the end of August.

Genus *Chrysops* Meigen

Species relatively small, 5–12 mm long. Frons of female wide, with height/basal width index 0.7–1.3, and with single, large frontal callus. Eye bare, often brilliantly colored, with arrangement of dark geometrical variously united patches forming distinctive possibly species-specific patterns. Antenna with both scape and pedicel longer than wide, subequal to or wider than flagellum; flagellum with long basal part (the combined first 4 flagellomeres) and 4 articulated apical flagellomeres. Facial area, involving clypeus and genae, somewhat bulging, more or less extensively glossy yellow to black; variation in extent of denudation on clypeus dependent on presence and extent of median pruinose band and on genae by extent of 2 foci of denudation, one above tentorial pit on border of clypeus and gena, and the other on subgena bordering oral cavity. Wing usually darkly banded or patterned. Sternite 8 of female terminalia long and narrow; caudal ends of spermathecal ducts slender, moderately sclerotized.

A large genus, *Chrysops*, comprises many species occurring in most regions of the world.

Key to species of *Chrysops*

Females

1. Clypeus with median pale pruinose stripe beneath antennae extending toward oral margin 2

   Clypeus without median pale pruinose stripe 18

2. Apex of wing beyond crossband hyaline (Figs. 93–101), at most a vague apical cloud along costa (Fig. 102) 3

   Apex of wing beyond crossband infuscated to varying extent so that an apical spot is present (Figs. 103, 104, 119, for example) 10

3. Sides of at least first 2 abdominal tergites with yellow to reddish areas 4

   Abdomen entirely black or with an indefinite pattern of grayish pruinose areas 7

4. Abdominal tergites with gray posterior borders. Infuscation of cell bm much less than that of cell br; apical costal portion of wing sometimes faintly infuscated (Fig. 102) (eastern) . . . . ***sordidus*** **Osten Sacken** (in part) (p. 145)

   Abdominal tergites with black posterior borders. Infuscation of cells br and bm about equal; apical costal portion of wing completely hyaline. 5

5. Wing pattern pale (Fig. 101). Thoracic pleura with gray pile. Median abdominal triangular markings absent (eastern) . . . . ***cuclux*** **Whitney** (p. 86)

   Wing pattern dark (Figs. 99, 100). Thoracic pleura with yellow or orange pile. Median abdominal triangular markings present 6

6. Median abdominal triangles absent (Fig. 141). Upper margin of frontal callus straight or gently rounded (widespread northern) . . . . ***dawsoni*** **Philip** (p. 88)

   Median abdominal triangles present (Fig. 164). Upper margin of frontal callus somewhat pointed medially (transcontinental) . . . . ***excitans*** **Walker** (p. 92)

7. Cell cua$_1$ with hyaline area at base 8

Cell cua$_1$ infuscated at base 9

8. Crossband rather broadly reaching hind margin of wing, with outer margin straight or slightly bowed; hyaline spot at base of cell cua$_1$ large, distinct; apex of wing hyaline (Fig. 95) (eastern) .... ***carbonarius* Walker** (p. 81)

Crossband usually not, or only narrowly, reaching hind margin of wing, with outer margin irregular; hyaline spot at base of cell cua$_1$ usually indistinct, sometimes almost obsolete; wing often with vague apical cloud in cell r$_1$ (Fig. 96) (transcontinental) .... ***ater* Macquart** (p. 75)

9. Thoracic pleura with yellow to orange red pile. Crossband usually broadly reaching hind margin of wing (Fig. 97) (eastern) .... ***cincticornis* Walker** (p. 83)

Thoracic pleura with grayish or pale yellowish pile. Crossband narrowly or not at all reaching hind margin of wing (Fig. 98) (transcontinental) .... ***mitis* Osten Sacken** (p. 109)

10. Pruinose stripe extending full length of clypeus. Bifurcation of R_{4+5} with a more or less isolated infuscated spot (Fig. 136) (western) .... ***discalis* Williston** (p. 91)

Pruinose stripe extending no more than two-thirds length of clypeus. Bifurcation of R_{4+5} lacking an isolated infuscated spot 11

11. Scape swollen, almost 1.5 times wider than other antennal segments (western) .... ***fulvaster* Osten Sacken** (p. 98)

Scape not swollen more than other antennal segments 12

12. Hyaline triangle crossing R_{2+3}, usually separating apical spot from crossband; apical spot narrow, paler than crossband (Figs. 102, 103) 13

Hyaline triangle extending at most to R_{2+3} and thus apical spot joined to crossband by at least width of cell r$_1$; apical spot of equal intensity to crossband 14

13. Cells br and bm each about equally infuscated in more than basal half (western montane) .... ***noctifer* Osten Sacken** (p. 117)

Infuscation of cell bm much less extensive than in cell br (eastern) .... ***sordidus* Osten Sacken** (in part) (p. 125)

14. Abdominal tergites 3–6 with relatively broad conspicuous yellow to orange posterior borders (Fig. 168). Large brightly colored species 15

Abdominal tergites 3–6 predominantly black, at most with very narrow inconspicuous yellowish posterior borders. Smaller, less brightly colored species 16

15. Hind tibia black. Crossband broadly and distinctly reaching hind margin of wing; hyaline triangle extending only to bifurcation of R_{4+5} (Fig. 127) (eastern) .... ***venus*** **Philip** (p. 131)

Hind tibia yellowish. Crossband narrowly or not at all reaching hind margin of wing; hyaline triangle crossing at least half of cell R_3 (Fig. 126) (western species) .... ***asbestos*** **Philip** (p. 74)

16. Legs often with considerable yellow; hind tibia never completely black. Apical spot on wing covering most of vein R_4 (Fig. 128) (transcontinental) .... ***frigidus*** **Osten Sacken** (p. 94)

All femora and tibiae predominantly black; hind tibia completely so. Apical spot covering little more than apical half of vein R_4 (Fig. 119, 120) 17

17. Spur-like extension from anterior margin of crossband usually reaching fork of R_{4+5}; apical spot not appreciably widened beyond crossband, crossing no more than apical half of R_4 (Fig. 119). Glossy areas of frontal callus and ocellar tubercle clearly separated by pruinose band; vertex pruinose (northern transcontinental) .... ***nigripes*** **Osten Sacken** (p. 115)

Spur-like extension from anterior margin of crossband rarely reaching fork of R_{4+5}; apical spot distinctly widened beyond crossband to cover about two-thirds of vein R_4 (Fig. 120). Glossy areas of frontal callus and ocellar tubercle united; vertex denuded and glossy black (eastern, with a disjunct population in Alberta) .... ***zinzalus*** **Philip** (p. 134)

18. Apex of wing beyond crossband hyaline 19

Apex of wing beyond crossband infuscated to varying extent so that apical spot is present 20

19. Vertex and occipital sclerite behind ocellar prominence predominantly glossy black. Sublateral thoracic stripes prominent (eastern) .... ***calvus*** **Pechuman & Teskey** (p. 79)

Vertex with at least a transverse pruinose line separating glossy area on median occipital sclerite from glossy ocellar prominence. Sublateral thoracic stripes indistinct (eastern) .... ***niger*** **Macquart** (p. 114)

20. Crossband and apical spot broken by paler areas along veins (Fig. 123). Abdomen longitudinally striate (Fig. 157) (eastern) .... ***shermani*** **Hine** (p. 124)

Dark markings of wing not broken by paler areas. Abdomen variably marked 21

21. Wing markings rather pale; a conspicuous spot covering bifurcation of R_{4+5}, often connected to strongly bowed crossband; apical spot filling cell r_4 (Fig. 135). Dull blackish species (east coastal) .... ***fuliginosus*** **Wiedemann** (p. 96)

Wing not with this combination of characters; if spot present at bifurcation, apical spot narrow 22

22. Apical spot dilutely extending around wing, reducing hyaline triangle to subhyaline area and not reaching hind margin of wing (Fig. 129). Large brown species with swollen scape and pedicel and little or no trace of abdominal markings (southern Ontario) .... ***brunneus*** **Hine** (p. 77)

Species not with above combination of characters 23

23. Cell br completely infuscated, rarely with a subhyaline ventral spot at apex 24

Cell br always at least one-third hyaline, sometimes almost entirely so 33

24. Hyaline triangle small but clear and distinct, restricted to apices of cells m_1 and m_2 (Fig. 133) (eastern) .... ***moechus*** **Osten Sacken** (p. 110)

Hyaline triangle extending toward anterior margin of wing beyond cell m_1 25

25. Apex of hyaline triangle nearly reaching or surpassing R_{2+3} 26

Apex of hyaline triangle not reaching R_{2+3} 29

26. Apical spot broad, extending across apical half or more of cell r_4 to apex of cell r_5 (Fig. 125) (southern Ontario) .... ***pikei*** **Whitney** (p. 119)

Apical spot small and narrow, extending only to apical corner of cell r_4 27

27. Hyaline triangle no more than reaching R_{2+3} (Fig. 111). Frontal callus yellow with dark dorsal margin. Ocellar area with shiny black integument less extensive. Fore coxa yellow (Ontario, rare) .... ***luteopennis*** **Philip** (p. 106)

Hyaline triangle crossing R_{2+3}, nearly separating apical spot from crossband (Figs. 104, 115). Frontal callus black. Ocelli surrounded by large shiny black area. Fore coxa black 28

28. Clypeus with prominent expansion of shiny black genal spot onto area above tentorial pit. Median occipital sclerite predominantly glossy black, with only lateral margins pruinose. Legs dark brown to dull orange, without strongly contrasting color (British Columbia) .... ***surdus*** **Osten Sacken** (p. 128)

Clypeus entirely yellow or with only narrow dark areas dorsolaterally. Median occipital sclerite entirely pruinose, or pruinosity restricted to lateral margins and dorsomedial patch. Legs with strongly contrasting black and yellow to orange areas (western) .... ***proclivis*** **Osten Sacken** (p. 120)

29. Abdomen with 4 dark longitudinal stripes (Figs. 156, 158, 159) 30

Abdomen not striped or with fewer than four stripes 32

30. Most of cell cua_1 infuscated (Fig. 131). Scutellum entirely yellow (eastern) .... ***vittatus*** **Wiedemann** (p. 132)

Cell cua_1 almost entirely hyaline. Scutellum dark, with or without paler apex or sides 31

31. Apical spot nearly filling cell r_4 (Fig. 130). Two central stripes of abdomen rarely joined on second segment. Frontal callus usually mostly yellow, rarely brown or black (eastern) .... ***aberrans*** **Philip** (p. 70)

Apical spot filling only about half of cell r_4 (Fig. 121). Two central stripes of abdomen usually joined on second segment (Fig. 156). Frontal callus usually black, rarely yellowish (Ontario) ... . ***striatus*** **Osten Sacken** (p. 126)

32. Apical spot filling most of cell r_4 and extending into cell r_5 and sometimes cell m_1, usually connecting with crossband by an infuscated streak in cell r_5 (Fig. 132). Abdomen with 2 dark sublateral stripes; stripes sometimes reduced to faint lines or enlarged to cover most of abdomen on each side of a nearly parallel-sided median yellow stripe (Fig. 162). Scutellum mostly yellow (southern Ontario) .... ***macquarti*** **Philip** (p. 107)

Apical spot filling only about half of cell r_4 and not extending further (Fig. 122). Abdomen not evenly striped (Fig. 147). Scutellum dark (eastern) .... ***indus*** **Osten Sacken** (p. 102)

33. Apical spot of nearly uniform width, encompassing only apical one-third of R_4 (Figs. 105–107, 110, 112) 34

Apical spot broadened, encompassing apical half or more of R_4 38

34. Apical spot just beyond where it leaves crossband as wide as or slightly wider than cell r_1 (Figs. 110, 112). Frontal callus sometimes yellow, often bordered with black or brown, or entirely black 35

Apical spot at base narrower or just as wide as cell r_1 (Fig. 105). Frontal callus black 36

35. Second abdominal tergite with median black inverted V extending length of segment; black V continuous with black markings on first and third tergites (Fig. 165). Robust species (Manitoba to Quebec) .... ***sackeni*** **Hine** (p. 122)

Second abdominal tergite with median black inverted V not attaining anterior and posterior margins and thus isolated from black markings on first and third tergites. Small, slender species (eastern, rare) .... ***pudicus*** **Osten Sacken** (p. 121)

36. Crossband pale and leaving about half of cell d hyaline (Fig. 105). Genae black. Clypeus with large black spot on each side (eastern) .... ***delicatulus*** **Osten Sacken** (p. 89)

Crossband dark and covering cell d. Clypeus and genae yellow or orange 37

37. Apical spot narrower than half width of cell r_1 and paler than crossband (Fig. 106). Frons nearly parallel-sided. Pale markings of abdomen usually grayish or dull yellow; second abdominal segment with black triangles, one on each side of the median dark marking, which may or may not be connected with median marking (Fig. 166) (widespread) .... ***aestuans*** **Wulp** (p. 72)

Apical spot varying from one-half to full width of cell r_1 and of same density as crossband (Fig. 107). Frons somewhat convergent at vertex. Pale markings of abdomen yellow, sometimes quite bright; second abdominal segment with dark median marking perhaps having projections along posterior margin of segment but not forming lateral triangles (Fig. 146) (Ontario, Quebec) .... ***callidus*** **Osten Sacken** (p. 78)

38. Abdomen almost black, with mid-dorsal yellow (occasionally grayish) stripe and sometimes with shorter sublateral pale stripe (Fig. 163) (eastern) .... ***univittatus*** **Macquart** (p. 129)

Abdomen with different pattern and showing more yellow 39

39. Apex of hyaline triangle clearly reaching or crossing vein R_{2+3} (Figs. 113, 114) 40

Apex of hyaline triangle not reaching vein R_{2+3} (Figs. 116, 117, 118) 43

40. At least basal half of cell br infuscated (Figs. 113, 114) 41

Cell br almost entirely hyaline (Fig. 118) 42

41. Frontal callus yellow. Clypeus and gena predominantly yellow (southern British Columbia) .... ***coloradensis*** **Bigot** (p. 85)

Frontal callus black. Clypeus yellow. Gena black or dark brown (transcontinental) .... ***furcatus*** **Walker** (p. 99)

42. Apical spot occupying almost all of cell r_4; crossband reaching hind margin of wing (Fig. 109) (southern Ontario) .... ***geminatus*** **Wiedemann** (p. 101)

Apical spot occupying only about half of cell r_4; crossband usually not reaching hind margin of wing (Fig. 108) (eastern) .... ***lateralis*** **Wiedemann** (p. 104)

43. Abdomen yellow with 4 longitudinal rows of dark spots; second segment with lateral spots perhaps reduced or absent; median figure on second segment an inverted V (Fig. 151). Scutellum and frontal callus normally dark but latter sometimes brownish (eastern) .... ***montanus*** **Osten Sacken** (p. 112)

Abdomen dominantly yellow; tergite 1 with brown inverted V and following tergites with transverse anterior brown bands (Fig. 148). Scutellum and frontal callus usually yellow 44

44. Thorax with yellowish to pale brownish pruinose areas separating darker brown subshining stripes (southern Ontario, rare) .... ***flavidus*** **Wiedeman** (p. 93)

Thorax with pruinose areas iridescent greenish or bluish gray and subshining stripes dark brown to black (southern Ontario) .. .. ***celatus*** **Pechuman** (p. 82)

Key to species of *Chrysops*

Males

1. Clypeus black, with median pruinose band beneath antennae extending at least half the distance to oral margin 2

Clypeus yellow, without or with very short median pruinose band beneath antennae 17

2. Apex of wing beyond crossband hyaline, with at most a vague apical cloud along costa 3

Apex of wing infuscated beyond crossband to varying extent so that an apical spot is present 9

3. Abdomen completely black 4

First 2 abdominal segments with small reddish or yellowish spots laterally 8

4. Cell cua_1 with hyaline area at base 5

Cell cua_1 infuscated at base 6

5. Outer margin of crossband straight or slightly and evenly bowed; crossband reaching hind margin of wing in cell m_3 and cua_1 in full intensity; hyaline area at base of cell cua_1 large and sharply defined .... ***carbonarius*** **Walker** (p. 81)

Outer margin of crossband usually bowed or irregular; crossband not reaching wing margin in full intensity; hyaline area at base of cell cua_1 usually not with clearly defined margin; apical area of wing sometimes dilutely infuscated ...... ***ater*** **Macquart** (p. 75)

6. Crossband broadly and distinctly reaching hind margin of wing; outer margin of crossband nearly straight .... ***cincticornis*** **Walker** (p. 83)

Crossband narrowly, indistinctly, or not at all reaching hind margin of wing; outer margin of crossband irregular 7

7. Subgena with many yellow hairs; such hairs frequently mixed with black hairs on thorax, legs, and abdomen. Yellow hairs on abdomen sometimes evident as faint pale patches .... ***excitans*** **Walker** (p. 92)

Subgena wholly black-haired; rarely with pale hairs on body. Pale abdominal markings absent .... ***mitis*** **Osten Sacken** (p. 109)

8. Wing pigmentation pattern pale .... ***cuclux*** **Whitney** (p. 86)

Wing pigmentation pattern dark .... ***dawsoni*** **Philip** (p. 88)

9. Apical spot narrow and indistinct, less than width of cell r_1 basally and not appreciably widened distally. Blackish species with paler abdominal markings, if present, restricted to sides of first 2 tergites and traces of small median and posterior markings .... ***sordidus*** **Osten Sacken** (p. 125)

Apical spot wider basally or toward wing tip and as dark as crossband. Other features variable 10

10. Black species. Abdomen at most with small reddish markings laterally on first 2 tergites. Wing with hyaline triangle reaching front margin of wing and separating apical spot from crossband .... ***noctifer*** **Osten Sacken** (p. 117)

Species with more extensive pale coloration, or apical spot not separated from crossband 11

11. Apical spot joined along posterior border to ventral portion of crossband, enclosing a subhyaline often sickle-shaped streak; cell dm usually subhyaline or fenestrate 12

Hyaline triangle open to posterior border of wing; crossband infrequently lighter in cell dm 13

12. Dorsum of abdomen quadrivittate. Scape robust but not swollen. Clypeus with lateral pruinose patches united to median pruinose band .... ***discalis*** **Williston** (p. 91)

    Dorsum of abdomen not quadrivittate. Scape swollen, almost twice diameter of pedicel. Lateral pruinose patches on clypeus not extending inward to join median pruinose band .... ***fulvaster*** **Osten Sacken** (p. 98)

13. Crossband with a projection reaching bifurcation of r_{4+5} .... ***nigripes*** **Zetterstedt** (p. 115)

    No such projection from crossband 14

14. Abdominal tergites 3–6 with relatively broad conspicuous yellow to orange posterior borders 15

    Abdominal tergites 3–6 predominantly black, at most with very narrow, inconspicuous yellowish posterior borders 16

15. Hind tibia black. Crossband broadly and distinctly reaching hind margin of wing; hyaline triangle extending only to bifurcation of R_{4+5} (eastern species) .... ***venus*** **Philip** (p. 131)

    Hind tibia yellowish. Crossband narrowly or not at all reaching hind margin of wing; hyaline triangle crossing at least half of cell r_3 (western species) .... ***asbestos*** **Philip** (p. 74)

16. Hind tibia black. Crossband extending no nearer hind margin of wing than about one-half length of M_3; hyaline triangle nearly reaching vein R_{2+3} .... ***zinzalus*** **Philip** (p. 134)

    Hind tibia more or less yellowish orange. Crossband nearly or actually reaching hind margin of wing; hyaline triangle not crossing vein R_{4+5} .... ***frigidus*** **Osten Sacken** (p. 94)

17. Apex of wing beyond crossband hyaline 18

    Apex of wing beyond crossband pigmented so that an apical spot is present 19

18. Thoracic stripes obsolete. Anal area of wing and cell cua_1 rather heavily infuscated with distinct hyaline spot at base of cell cua_1 .... ***niger*** **Macquart** (p. 114)

    Thoracic stripes fairly distinct. Anal area and cell cua_1 lightly tinted to nearly hyaline .... ***calvus*** **Pechuman & Teskey** (p 79)

19. Abdomen black with no yellow markings 20

    Abdomen with yellowish markings 21

20. Hyaline triangle restricted to apices of cells m_1 and m_2 .... ***moechus*** **Osten Sacken** (p. 110)

Hyaline triangle a narrow crescent-shaped streak from cell r_1 to middle of cell m_2, with apices of cells r_5 to m_2 more or less subhyaline .... ***fuliginosus*** **Wiedemann** (p. 96)

21. Crossband and apical spot broken by dilute areas along veins .... ***shermani*** **Hine** (p. 124)

Crossband and apical spot not broken by dilute areas, although whole wing may be pale 22

22. Yellowish brown species with no definite abdominal pattern. Hyaline triangle not or only narrowly in contact with hind border of wing and in the form of a clear line extending from middle of cell m_3 to cell r_3 anterior to bifurcation of R_{4+5} .... ***brunneus*** **Hine** (p. 74)

Different-colored species, or hyaline triangle in broad contact with hind border of wing and apical spot not extending posterior to cell r_4 23

23. Black species. Abdomen with yellowish median longitudinal stripe, occasionally with similar abbreviated stripe on each side. Apical spot rarely occupying more than half of cell r_4 and often less .... ***univittatus*** **Macquart** (p. 129)

Not with above combination of characters 24

24. Base of apical wing spot adjacent to crossband more dilute than crossband and about same width as cell r_1; base of cell cua_1 with isolated hyaline spot 25

Lacking one or both of these features 26

25. Prominent expansion of glossy black spots on gena above tentorial pit onto clypeus. Clypeus with thin median line of pruinosity from below antennae to base of proboscis. Apical wing spot little widened beyond base and entering only apex of cell R_4 .... ***surdus*** **Osten Sacken** (p. 128)

Glossy black area on gena above tentorial pit rarely extending onto clypeus. Clypeus with pruinose stripe extending much less than half its length. Apical wing spot expanded apically to cross at least half of vein R_4 .... ***proclivis*** **Osten Sacken** (p. 120)

26. Apical spot very little, if at all, wider than cell r_1 at its origin, crossing R_4 at its apex and occupying very little of cell r_4 27

Apical spot considerably broader than cell r_1 at base or crossing at least half of R_4 30

27. Hyaline triangle not reaching R_{2+3}. Hind tibia yellow .... ***sackeni*** **Hine** (p. 122)

Hyaline triangle reaching or crossing R_{2+3}. Hind tibia black 28

28. Gena with large black spot beside tentorial pit .... ***delicatulus*** **Osten Sacken** (p. 89)

Gena entirely orange or at most with some dark shading around tentorial pit 29

29. Second abdominal segment with sublateral black triangles joining with median figure along posterior border of segment. Cell m$_3$ usually hyaline at apex and cell cua$_1$ with considerable infuscation, especially basally. Pale markings of abdomen grayish yellow .... ***aestuans*** **Wulp** (p. 72)

Second abdominal segment without sublateral black triangles. Cell m$_3$ usually entirely infuscated and cell cua$_1$ often mostly hyaline. Pale markings yellow .... ***callidus*** **Osten Sacken** (p. 78)

30. Second abdominal tergite predominantly black, with median and sublateral yellowish triangles on posterior border .... ***coloradensis*** **Bigot** (p. 85)

Second abdominal tergite broadly yellowish laterally, so that yellow sublateral triangles not evident 31

31. Second abdominal tergite with large black median figure broadly joined to black area on first tergite; median yellow triangles not reaching anterior border of segments. Apical spot occupying one-half to two-thirds of cell r$_4$ 32

Not with above combination of characters 35

32. Gena with black spot above tentorial pit .... ***furcatus*** **Walker** (p. 99)

Gena entirely yellow 33

33. Abdomen with sublateral row of narrow black spots; median yellow triangles moderate in size. Hyaline triangle extending beyond bifurcation of R$_{4+5}$, sometimes reaching R$_{2+3}$ 34

Abdomen without sublateral row of black spots; median triangles very small, sometimes obsolete. Hyaline triangle ends at bifurcation of R$_{4+5}$ .... ***indus*** **Osten Sacken** (p. 102)

34. Apical spot little broader apically than at origin, crossing no more than two-thirds of R$_4$ and occupying about half of cell r$_4$ .... ***luteopennis*** **Philip** (p. 106)

Apical spot conspicuously broadened apically, crossing most of R$_4$ and nearly filling cell r$_4$ ...... ***montanus*** **Osten Sacken** (p. 112)

35. Apical spot filling about half or less of cell r$_4$ 36

Apical spot filling all or nearly all of cell r$_4$, sometimes extending into cell r$_5$ 39

36. Gena with black spot beside tentorial pit. Hyaline triangle crossing R_{2+3} .... *lateralis* **Wiedemann** (p. 104)

Gena entirely yellow. Hyaline triangle not crossing R_{2+3} 37

37. Thorax yellow or brownish in ground color, with brown subshiny stripes .... *flavidus* **Wiedemann** (p. 93)

Thorax greenish or bluish gray, with brownish black subshiny stripes 38

38. Hind femora mostly black. First abdominal tergite mostly black. Darker abdominal markings usually intense. Cua_1 dark basally .... *pudicus* **Osten Sacken** (p. 121)

Hind femora mostly yellow. First abdominal tergite extensively yellow. Abdominal markings often faded. Cua_1 clear basally .... *celatus* **Pechuman** (p. 82)

39. Hyaline triangle reaching costal margin, separating apical spot from crossband; apical spot nearly filling cell r_4 but not extending beyond. Yellow species with black submedian spots joined on second tergite .... *geminatus* **Wiedemann** (p. 101)

Not with this combination of characters 40

40. Hyaline triangle reaching or nearly reaching R_{2+3} .... *pikei* **Whitney** (p. 119)

Hyaline triangle scarcely extending beyond bifurcation of R_{4+5} 41

41. Abdomen with median yellow stripe and longitudinal black band on each side; lateral margins of segments narrowly yellow .... *macquarti* **Philip** (p. 107)

Abdomen yellow with 4 more or less complete rows of black spots 42

42. Ground color of thorax and scutellum yellow .... *vittatus* **Wiedemann** (p. 132)

Ground color of thorax iridescent greenish or blue gray; scutellum black 43

43. Apical spot completely filling cell r_4. Sublateral rows of abdominal spots about as dark as median rows .... *aberrans* **Philip** (p. 70)

Apical spot not completely filling cell r_4. Sublateral rows of abdominal spots paler than median rows .... *striatus* **Osten Sacken** (p. 126)

Tableau d'identification des espèces du genre *Chrysops*

Femelles

1. Clypéus portant, dans sa partie médiane, une bande pruineuse pâle, dessous les antennes jusque vers la marge buccale 2

   Clypéus sans bande pruineuse pâle en position médiane 18

2. Apex alaire transparent au-delà de la bande transversale (fig. 93 à 101), une vague nébulosité apicale, au plus, suivant la nervure costale (fig. 102) 3

   Apex alaire brunâtre au-delà de la bande transversale, mais sur une étendue variable de sorte qu'une tache apicale est présente (fig. 103, 104, 119, par exemple) 10

3. Zones jaunes à rougeâtres sur les côtés des deux premiers tergites au moins 4

   Abdomen tout noir ou orné d'un vague motif de zones à pruinosité grisâtre 7

4. Bords postérieurs des tergites gris. Cellule bm beaucoup moins brunâtre que la br; zone costale et apicale de l'aile parfois faiblement brunâtre (fig. 102) (est) .... ***sordidus*** **Osten Sacken** (*partim*) (p. 145)

   Bords postérieurs des tergites noirs. Cellules br et bm à peu près également brunâtres; zone costale et apicale de l'aile toute transparente 5

5. Motif alaire pâle (fig. 101). Pleurites thoraciques tapissés de poils gris; pas de marque triangulaire sur la partie médiane de l'abdomen (Est) .... ***cuclux*** **Whitney** (p. 86)

   Motif alaire foncé (fig. 99, 100). Pleurites thoraciques tapissés de poils jaunes ou orange; marques triangulaires sur la partie médiane de l'abdomen 6

6. Pas de triangle sur la partie médiane de l'abdomen (fig. 141). Marge supérieure du calus frontal rectiligne ou légèrement courbe (espèce répandue dans le nord) .... ***dawsoni*** **Philip** (p. 88)

   Triangles sur la partie médiane de l'abdomen (fig. 164). Marge supérieure du calus frontal formant une pointe médiane (d'un bout à l'autre du continent) .... ***excitans*** **Walker** (p. 92)

7. Cellule cua$_1$ à zone basale transparente 8

   Cellule cua$_1$ à zone basale brunâtre 9

8. Bande transversale atteignant amplement le bord postérieur de l'aile, la marge apicale étant droite ou légèrement courbée; à la

base de la cellule cua_1, zone transparente étendue et distincte; apex alaire transparent (fig. 95) (Est) .... *carbonarius* **Walker** (p. 81)

Bande transversale n'atteignant habituellement pas la marge postérieure de l'aile ou s'en approchant sur un front étroit; marge apicale irrégulière; à la base de la cellule cua_1, zone de transparence floue, parfois presque atrophiée; aile souvent affectée d'une vague nébulosité apicale dans la cellule r_1 (fig. 96) (d'un bout à l'autre du continent) .... *ater* **Macquart** (p. 75)

9. Pleurites thoraciques tapissés de poils jaunes à rouge orangé. Bande transversale atteignant amplement le bord postérieur de l'aile ou s'en approchant habituellement (fig. 97) (Est) .... *cincticornis* **Walker** (p. 83)

Pleurites thoraciques tapissés de poils grisâtres ou jaunâtre pâle. Bande transversale atteignant tout juste ou pas du tout le bord postérieur de l'aile (fig. 98) (d'un bout à l'autre du continent) .... *mitis* **Osten Sacken** (p. 109)

10. Raie pruineuse sur toute la longueur du clypéus. Tache brunâtre plus ou moins isolée à la bifurcation de R_{4+5} (fig. 136) (Ouest) ... . *discalis* **Williston** (p. 91)

Raie pruineuse sur pas plus des deux tiers de la longueur du clypéus. Pas de tache brunâtre isolée à la bifurcation de R_{4+5} 11

11. Scape enflé, près de 1,5 fois plus large que les autres segments de l'antenne (Ouest) .... *fulvaster* **Osten Sacken** (p. 98)

Scape pas plus enflé que les autres segments de l'antenne 12

12. Triangle transparent traversant R_{2+3}, séparant habituellement la tache apicale de la bande transversale; tache apicale étroite, plus pâle que la bande transversale (fig. 102, 103) 13

Triangle transparent s'étendant au plus jusqu'à R_{2+3}, ce qui fait que la tache apicale est unie à la bande transversale par au moins la largeur de la cellule r_1; tache et bande de la même teinte 14

13. Cellules br et bm brunâtres sur une étendue à peu près égale sur plus de la moitié basale (montagnes de l'Ouest) .... *noctifer* **Osten Sacken** (p. 117)

Etendue brunâtre de la cellule bm beaucoup moins grande que celle, homologue, de la cellule br (Est) .... *sordidus* **Osten Sacken** (*partim*) (p. 125)

14. Tergites 3 à 6 ornés de bords postérieurs jaunes à orange, larges, très visibles (fig. 168). Espèces de forte taille, brillamment colorées 15

Tergites 3 à 6 surtout noirs, soulignés, au plus, de bords postérieurs jaunâtres, très étroits, peu visibles. Espèces de petite taille plus ternes 16

15. Tibia postérieur noir. Bande transversale atteignant amplement et nettement le bord postérieur de l'aile; triangle transparent n'atteignant que la bifurcation R_{4+5} (fig. 127) (Est) .... *venus* **Philip** (p. 131)

Tibia postérieur jaunâtre. Bande transversale atteignant tout juste ou pas du tout le bord postérieur de l'aile; triangle transparent dépassant au moins la moitié de la cellule R_3 (fig. 126) (Ouest) .... *asbestos* **Philip** (p. 74)

16. Beaucoup de jaune, souvent, aux pattes; tibia postérieur jamais tout noir. Tache apicale sur l'aile couvrant la plus grande partie de la nervure R_4 (fig. 128) (d'un bout à l'autre du continent) .... *frigidus* **Osten Sacken** (p. 94)

Tous les fémurs et tibias à prédominance noire; tibia postérieur tout noir. Tache apicale couvrant un peu plus de la moitié de la nervure R_4 (fig. 119, 120) 17

17. Projection en forme d'éperon à partir de la marge antérieure de la bande transversale, atteignant habituellement la bifurcation de R_{4+5}; tache apicale ne s'élargissant pas de façon appréciable au-delà de la bande transversale, ne dépassant pas la moitié apicale de R_4 (fig. 119). Zones lustrées du calus frontal et du tubercule des ocelles nettement séparées par une bande pruineuse; vertex pruineux (tout le nord du continent) .... *nigripes* **Osten Sacken** (p. 115)

Projection en forme d'éperon à partir de la marge antérieure de la bande transversale atteignant rarement la bifurcation de R_{4+5}; tache apicale nettement élargie au-delà de la bande transversale de façon à couvrir les deux tiers de la nervure R_4 (fig. 120). Zones lustrées du calus frontal et du tubercule des ocelles réunies; vertex glabre et noir lustré (Est, plus une population géographiquement séparée en Alberta) .... *zinzalus* **Philip** (p. 134)

18. Apex de l'aile transparent au-delà de la bande transversale ... 19

Apex de l'aile au-delà de la bande transversale d'une teinte brunâtre d'étendue variable matérialisant une tache apicale 20

19. Vertex et sclérite occipital derrière la protubérance des ocelles surtout d'un noir lustré. Rayures thoraciques sublatérales protubérantes (Est) .... *calvus* **Pechuman et Teskey** (p. 79)

Vertex barré d'au moins une ligne transversale pruineuse séparant la région lustrée du sclérite médio-occipital et celle, également lustrée, de la protubérance des ocelles. Rayures thoraciques sublatérales indistinctes (Est) .... *niger* **Macquart** (p. 114)

20. Bande transversale et tache apicale interrompues par des zones plus pâles le long des nervures (fig. 123). Striation longitudinale sur l'abdomen (fig. 157) (Est) .... *shermani* **Hine** (p. 124)

Marques foncées des ailes non interrompues par des zones plus pâles. Abdomen diversement marqué 21

21. Marques alaires plutôt pâles; tache visible sur la bifurcation de R_{4+5}, souvent jointe à une bande transversale fortement arquée; tache apicale emplissant la cellule r_4 (fig. 135). Livrée d'un noir terne (littoral de l'Est) ....*fuliginosus* **Wiedemann** (p. 96)

Aile dépourvue de la combinaison précitée de caractères; s'il y a une tache apicale à la bifurcation, elle est étroite 22

22. Tache apicale diluée sur le pourtour de l'aile, réduisant le triangle transparent à une zone quasi transparente n'atteignant pas le bord postérieur de l'aile (fig. 129). Espèces de forte taille, à la livrée brune, à scape et à pédicelle enflés avec peu ou point de marques abdominales (sud de l'Ontario) .... *brunneus* **Hine** (p. 77)

Espèces dépourvues de la combinaison précitée de caractères 23

23. Cellule br toute brunâtre, rarement ornée d'une tache ventrale quasi transparente à l'apex 24

Cellule br toujours transparente au moins sur un tiers de son étendue, parfois presque sur toute l'étendue 33

24. Triangle transparent petit, mais net, limité aux apex des cellules m_1 et m_2 (fig. 133) (Est) .... *moechus* **Osten Sacken** (p. 110)

Triangle transparent s'étendant vers le bord antérieur de l'aile au-delà de la cellule m_1 25

25. Apex du triangle transparent atteignant presque ou franchissant R_{2+3} 26

Apex du triangle transparent n'atteignant pas R_{2+3} 29

26. Tache apicale large, couvrant au moins la moitié apicale de la cellule r_4 jusqu'à l'apex de la cellule r_5 (fig. 125) (sud de l'Ontario) .... *pikei* **Whitney** (p. 119)

Tache apicale petite et étroite, n'atteignant que l'angle apical de la cellule r_4 27

27. Triangle transparent s'arrêtant, au plus, à R_{2+3} (fig. 111). Calus frontal jaune, à marge dorsale foncée. Région des ocelles, au

tégument noir luisant, peu étendue. Hanche antérieure jaune (Ontario, rare) .... ***luteopennis* Philip** (p. 106)

Triangle transparent traversant R_{2+3}, coupant presque la tache apicale de la bande transversale (fig. 104, 115). Calus frontal noir. Ocelles entourées d'une grande étendue noir brillant. Hanche antérieure noire 28

28. Sur le clypéus, prolongement éminent de la tache de la joue noir brillant jusqu'au-dessus de la fossette tentoriale. Sclérite médio-occipital surtout noir lustré, pruineux uniquement sur ses marges latérales. Pattes brun foncé à orange terne, sans couleur très contrastée (Colombie-Britannique) .... ***surdus* Osten Sacken** (p. 128)

Clypéus tout jaune ou orné de zones foncées étroites dans la région dorsolatérale. Sclérite médio-occipital tout pruineux ou pruineux sur ses bords latéraux et sur la partie médiodorsale. Pattes portant des zones noires et jaunes à orange fortement contrastées (Ouest) .... ***proclivis* Osten Sacken** (p. 120)

29. Abdomen orné de 4 raies longitudinales foncées (fig. 156, 158, 159) 30

Abdomen uni ou portant 3 raies au plus 32

30. Cellule cua_1 brunâtre sur sa plus grande étendue (fig. 131). Scutellum tout jaune (Est) .... ***vittatus* Wiedemann** (p. 132)

Cellule cua_1 presque toute transparente. Scutellum sombre, avec ou sans apex ou côtés plus pâles 31

31. Tache apicale emplissant presque la cellule r_4 (fig. 130). Les 2 rayures centrales de l'abdomen rarement réunies sur le second segment. Calus frontal habituellement jaune en grande partie, rarement brun ou noir (Est) .... ***aberrans* Philip** (p. 70)

Tache apicale n'emplissant que la moitié de la cellule r_4 (fig. 121). Les deux rayures centrales de l'abdomen habituellement réunies sur le deuxième segment (fig. 156). Calus frontal habituellement noir, rarement jaunâtre (Ontario) .... ***striatus* Osten Sacken** (p. 126)

32. Tache apicale emplissant presque toute la cellule r_4 et s'étendant jusque dans la cellule r_5 et parfois même la cellule m_1, habituellement réunie à la bande transversale par une traînée brunâtre dans la cellule r_5 (fig. 132). Deux raies foncées, sublatérales sur l'abdomen; parfois réduites à des traits peu accusés ou agrandies au point de couvrir la plus grande partie de l'abdomen de part et d'autre d'une bande jaune médiane aux côtés presque parallèles (fig. 162). Scutellum surtout jaune (sud de l'Ontario) .... ***macquarti* Philip** (p. 107)

Tache apicale n'emplissant que la moitié de la cellule r_4 et qui y est confinée (fig. 122). Abdomen irrégulièrement rayé (fig. 147). Scutellum foncé (Est) .... ***indus*** **Osten Sacken** (p. 102)

33. Tache apicale de largeur presque uniforme, ne couvrant que le tiers apical de R_4 (fig. 105 à 107, 110, 112) 34

Tache apicale allant en s'élargissant, couvrant au moins la moitié apicale de R_4 38

34. Tache apicale, immédiatement après le point où elle se démarque de la bande transversale, aussi large , ou un peu plus, que la cellule r_1 (fig. 110, 112). Calus frontal parfois jaune, souvent encadré de noir ou de brun, ou tout noir 35

Tache apicale plus étroite, à sa base, ou aussi large que la cellule r_1 (fig. 105). Calus frontal noir 36

35. Deuxième tergite orné d'un V médian noir, inversé sur toute la longueur du segment; le V prolongeant les marques noires des tergites 1 et 3 (fig. 165). Espèce de forte taille (du Manitoba au Québec) .... ***sackeni*** **Hine** (p. 122)

Deuxième tergite orné d'un V médian noir, inversé, sans contact avec les marges antérieure et postérieure, donc isolé des marques noires des tergites 1 et 3. Espèce de taille modeste (Est, rare) .... ***pudicus*** **Osten Sacken** (p. 121)

36. Bande transversale pâle, laissant transparente la moitié de la cellule d (fig. 105). Joues noires. Clypéus orné d'une grosse tache noire sur chaque côté (Est) .... ***delicatulus*** **Osten Sacken** (p. 89)

Bande transversale foncée et couvrant la cellule d. Clypéus et joues jaunes ou orange 37

37. Tache apicale plus étroite que la demi-largeur de la cellule r_1 et plus pâle que la bande transversale (fig. 106). Front aux côtés quasi parallèles. Marques pâles de l'abdomen habituellement grisâtres ou jaune terne; deuxième segment abdominal orné de triangles noirs, un de chaque côté de la marque foncée médiane, qui peuvent ou non lui être reliés (fig. 166). (espèce répandue) ... . ***aestuans*** **Wulp** (p. 72)

Tache apicale de largeur variant entre la moitié et la totalité de celle de la cellule r_1 et de même teinte que la bande transversale (fig. 107). Front quelque peu convergent au vertex. Marques pâles de l'abdomen jaunes, parfois bien brillantes; deuxième segment abdominal orné de marques médianes foncées, se prolongeant peut-être le long de la marge postérieure du segment, mais sans former de triangles latéraux (fig. 146) (Ontario, Québec) .... ***callidus*** **Osten Sacken** (p. 78)

38. Abdomen presque noir, la région médio-dorsale étant traversée d'une rayure jaune (parfois grisâtre) et parfois d'une rayure pâle, sublatérale, plus courte (fig. 163) (Est) .... **_univittatus_ Macquart** (p. 129)

Motif abdominal différent du précité, montrant plus de jaune 39

39. Apex du triangle transparent atteignant nettement la nervure R$_{2+3}$ ou la traversant (fig. 113, 114) 40

Apex du triangle transparent n'atteignant pas la nervure R$_{2+3}$ (fig. 116, 117, 118) 43

40. Au moins la moitié basale de la cellule br brunâtre (fig. 113, 114) 41

Cellule br presque toute transparente (fig. 118) 42

41. Calus frontal jaune. Clypéus et joue surtout jaunes (sud de la Colombie-Britannique) .... **_coloradensis_ Bigot** (p. 85)

Calus frontal noir. Clypéus jaune. Joue noire ou brun foncé (d'un bout à l'autre du continent) .... **_furcatus_ Walker** (p. 99)

42. Tache apicale occupant presque toute la cellule r$_4$; bande transversale atteignant le bord postérieur de l'aile (fig. 109) (sud de l'Ontario) .... **_geminatus_ Wiedemann** (p. 101)

Tache apicale n'occupant que la moitié de la cellule r$_4$; bande transversale atteignant le bord postérieur de l'aile (fig. 108) (Est) .... **_lateralis_ Wiedemann** (p. 104)

43. Abdomen jaune, ponctué de 4 rangées longitudinales de taches foncées; taches latérales du deuxième segment peut-être réduites ou manquantes; V inversé sur la médiane du même segment (fig. 151). Scutellum et calus frontal ordinairement foncés, mais calus parfois brunâtre (Est) .... **_montanus_ Osten Sacken** (p. 112)

Abdomen surtout jaune; tergite 1 orné d'un V inversé brun et les tergites postérieurs, de bandes brunes transversales en position antérieure (fig. 148). Scutellum et calus frontal ordinairement jaunes 44

44. Thorax comportant des zones pruineuses jaunâtres à brunâtre pâle séparant des bandes assez brillantes, brun foncé (sud de l'Ontario, rare) .... **_flavidus_ Wiedemann** (p. 93)

Thorax comportant des zones pruineuses verdâtre irisé ou gris-bleuâtre et des bandes assez brillantes, brun foncé à noires (sud de l'Ontario) .... **_celatus_ Pechuman** (p. 82)

Tableau d'identification des espèces du genre *Chrysops*

Mâles

1. Clypéus portant, dans sa partie médiane, une bande pruineuse, de dessous les antennes jusqu'à la moitié, au moins, de la distance vers la marge buccale 2

   Clypéus jaune; la bande pruineuse en position médiane, sous les antennes, manquante ou très courte 17

2. Apex alaire transparent au-delà de la bande transversale une vague nébulosité apicale, tout au plus, suivant la nervure costale 3

   Apex alaire brunâtre au-delà de la bande transversale, mais sur une étendue variable, de sorte qu'une tache apicale est présente 9

3. Abdomen tout noir 4

   Côtés des deux premiers segments abdominaux portant des taches rougeâtres ou jaunâtres 8

4. Cellule cua_1 à zone basale transparente 5

   Cellule cua_1 à zone basale brunâtre 6

5. Marge extérieure de la bande transversale, rectiligne ou régulièrement courbe; bande transversale atteignant dans toute son intensité le bord postérieur de l'aile dans la cellule m_3 et cua_1; dans la partie basale de la cellule cua_1, zone transparente, étendue et nette .... ***carbonarius* Walker** (p. 81)

   Marge extérieure de la bande transversale habituellement courbe ou irrégulière; bande transversale n'atteignant pas le bord de l'aile dans toute son intensité; dans la partie basale de la cellule cua_1, zone de transparence floue; région apicale de l'aile parfois délavée de brun .... ***ater* Macquart** (p. 75)

6. Bande transversale atteignant amplement et nettement le bord postérieur de l'aile; sa marge apicale presque rectiligne .... ***cincticornis* Walker** (p. 83)

   Bande transversale atteignant tout juste, de façon indistincte ou pas du tout, le bord postérieur de l'aile; sa marge extérieure irrégulière 7

7. Bande subgénale portant de nombreux poils jaunes; poils jaunes souvent mêlés de poils noirs sur le thorax, les pattes et l'abdomen. Poils jaunes de l'abdomen se matérialisant parfois en plages très pâles .... ***excitans* Walker** (p. 92)

Poils de la bande subgénale tous noirs; sur le reste du corps, poils rarement pâles. Pas de marques pâles sur l'abdomen .... *mitis* **Osten Sacken** (p. 109)

8. Motif pigmentaire des ailes pâle .... *cuclux* **Whitney** (p. 86)

Motif pigmentaire des ailes foncé .... *dawsoni* **Philip** (p. 88)

9. Tache apicale étroite et floue, moins large que la cellule r_1 dans sa partie basale et ne s'élargissant pas de façon appréciable vers sa partie apicale. Livrée noirâtre ornée, le cas échéant, de marques abdominales plus pâles, confinées sur les côtés des 2 premiers tergites, ainsi que des vestiges de petites marques médianes et postérieures .... *sordidus* **Osten Sacken** (p. 125)

Tache apicale plus large à sa partie basale ou vers l'extrémité de l'aile et aussi foncée que la bande transversale. Autres caractéristiques variables 10

10. Livrée noire. Abdomen portant, au plus, de petites marques rougeâtres latérales sur les 2 premiers tergites. Triangle transparent atteignant le bord postérieur de l'aile et coupant la tache apicale de la bande transversale .... *noctifer* **Osten Sacken** (p. 117)

Espèces dont la livrée comporte une coloration pâle plus étendue, ou sur l'aile desquelles la tache apicale n'est pas coupée de la bande transversale 11

11. Tache apicale jointe, le long du bord postérieur, à la partie ventrale de la bande transversale, entourant une traînée quasi transparente, souvent falciforme; cellule dm habituellement quasi transparente ou fenêtrée 12

Triangle transparent s'ouvrant sur le bord postérieur de l'aile; bande transversale rarement moins accentuée dans la cellule dm 13

12. Partie dorsale de l'abdomen ornée de quatre stries. Scape robuste, mais non enflé. Clypéus portant des plages pruineuses latérales, unies à une bande pruineuse médiane .... *discalis* **Williston** (p. 91)

Partie dorsale de l'abdomen ne portant pas quatre stries. Scape enflé, d'un diamètre presque du double de celui du pédicelle. Plages latérales pruineuses du clypéus ne se prolongeant pas vers l'intérieur jusqu'à la bande pruineuse médiane .... *fulvaster* **Osten Sacken** (p. 98)

13. Projection de la bande transversale atteignant la bifurcation de r_{4+5} .... *nigripes* **Zetterstedt** (p. 115)

Pas de telle projection de la bande transversale 14

14. Tergites 3 à 6 ornés d'un large liséré jaune à orange, bien visible, sur leurs bords postérieurs 15

Tergites 3 à 6 surtout noirs, soulignés, tout au plus, d'un liséré jaunâtre très fin, peu visible, sur leurs bords postérieurs 16

15. Tibia postérieur noir. Bande transversale atteignant amplement et nettement la marge postérieure de l'aile; triangle transparent n'atteignant que la bifurcation R_{4+5} (Est) .... ***venus*** **Philip** (p. 131)

Tibia postérieur jaunâtre. Bande transversale atteignant tout juste ou pas du tout la marge postérieure de l'aile; triangle transparent traversant au moins la moitié de la cellule r_3 (Ouest) .... ***asbestos*** **Philip** (p. 74)

16. Tibia postérieur noir. Bande transversale n'approchant pas à moins de la demi-longueur de M_3 de la marge postérieure de l'aile; triangle transparent touchant presque la nervure R_{2+3} ... . ***zinzalus*** **Philip** (p. 134)

Tibia postérieur plus ou moins orange jaunâtre. Bande transversale atteignant presque ou effectivement la marge postérieure de l'aile; triangle transparent ne traversant pas la nervure R_{4+5} .... ***frigidus*** **Osten Sacken** (p. 94)

17. Apex alaire, au-delà de la bande transversale, transparent ... 18

Apex alaire, au-delà de la bande transversale, pigmenté, de sorte que s'y matérialise une tache apicale 19

18. Rayures thoraciques atrophiées. Région anale de l'aile et cellule cua$_1$ plutôt fortement teintées de brun, une tache transparente se détachant nettement dans la partie basale de la cellule .... ***niger*** **Macquart** (p. 114)

Rayures thoraciques assez nettes. Région anale et cellule cua$_1$ faiblement teintées à presque transparentes .... ***calvus*** **Pechuman & Teskey** (p. 79)

19. Abdomen noir, sans marques jaunes 20

Abdomen ayant des marques jaunâtres 21

20. Triangle transparent limité à l'apex des cellules m_1 et m_2 .... ***moechus*** **Osten Sacken** (p. 110)

Triangle transparent formant une étroite traînée falciforme de la cellule r_1 au milieu de la cellule m_2, l'apex des cellules r_5 à m_2 étant plus ou moins transparent .... ***fuliginosus*** **Wiedemann** (p. 96)

21. Bande transversale et tache apicale interrompues de zones délavées le long des nervures .... ***shermani*** **Hine** (p. 124)

Bande transversale et tache apicale sans zone délavée, même si, dans son ensemble, l'aile peut être de couleur pâle 22

22. Espèce à la livrée brun jaunâtre, sans motif abdominal précis. Triangle transparent ne touchant pas le bord postérieur de l'aile ou le touchant de peu et prenant la forme d'un trait clair allant du milieu de la cellule m_3 à la cellule r_3, en avant de la bifurcation de R_{4+5} . . . . ***brunneus* Hine** (p. 74)

Espèces à la livrée diversement colorée ou présentant un triangle transparent amplement en contact avec le bord postérieur de l'aile et une tache apicale ne s'étendant pas plus loin, vers l'arrière, que la cellule r_4 23

23. Espèce à la livrée noire. Rayure longitudinale jaunâtre sur le milieu de l'abdomen, parfois accompagnée, de chaque côté, d'une rayure plus courte, semblable. Tache apicale occupant rarement plus de la moitié de la cellule r_4, souvent moins . . . . ***univittatus* Macquart** (p. 129)

Espèces dépourvues de la combinaison précitée de caractères 24

24. Partie basale de la tache apicale de l'aile, jouxtant la bande transversale, d'une teinte plus délavée que celle de la bande et à peu près aussi large que la cellule r_1; zone transparente isolée dans la partie basale de la cellule cua_1 25

Au moins un des caractères précités manquant 26

25. Prolongement remarquable des taches noires et lustrées de la joue, au-dessus de la fossette tentoriale jusque sur le clypéus. Ce dernier, traversé d'une maigre ligne pruineuse, de sous les antennes jusqu'à la base de la trompe. Tache apicale de l'aile un peu élargie vers sa partie apicale et ne pénétrant dans la cellule R_4 qu'à l'apex de cette dernière . . . . ***surdus* Osten Sacken** (p. 128)

Zone noire et lustrée de la joue, au-dessus de la fossette tentoriale, se prolongeant rarement jusque sur le clypéus. Ce dernier, traversé d'une rayure pruineuse sur beaucoup moins de la moitié de sa longueur. Tache apicale de l'aile s'étendant dans le sens apical et traversant au moins à sa moitié la nervure R_4 . . . . ***proclivis* Osten Sacken** (p. 120)

26. Tache apicale à peine plus large, pour autant qu'elle l'est, que la cellule r_1 dans sa partie basale ou traversant R_4 à son apex et occupant très peu de la cellule r_4 27

Tache apicale considérablement plus large que la cellule r1 dans sa partie basale ou traversant au moins la moitié de R_4 30

27. Triangle transparent n'atteignant pas R_{2+3}. Tibia postérieur jaune .... ***sackeni* Hine** (p. 122)

Triangle transparent atteignant ou traversant R_{2+3}. Tibia postérieur noir 28

28. Joue portant une grosse tache noire à côté de la fossette tentoriale .... ***delicatulus* Osten Sacken** (p. 89)

Joue tout orange ou, tout au plus, ombragée autour de la fossette tentoriale 29

29. Deuxième segment abdominal orné de triangles noirs sublatéraux rejoignant un dessin en position médiane, le long du bord postérieur du segment. Cellule m_3 habituellement transparente à son apex et cellule cua_1 à coloration brunâtre dense, surtout dans sa partie basale. Sur l'abdomen, marques pâles d'un jaune grisâtre .... ***aestuans* Wulp** (p. 72)

Deuxième segment abdominal sans triangle noir sublatéral. Cellule m_3 habituellement toute brunâtre et cellule cua_1 souvent en plus grande partie transparente. Marques pâles jaunes .... **callidus Osten Sacken** (p. 78)

30. Deuxième tergite surtout noir, comportant des triangles jaunâtres, médians et sublatéraux, sur son bord postérieur .... ***coloradensis* Bigot** (p. 85)

Deuxième tergite largement jaunâtre sur ses côtés, de sorte que les triangles sublatéraux jaunes ne sont pas visibles 31

31. Deuxième tergite comportant un gros dessin médian, noir, amplement en contact avec la zone noire du premier tergite; triangles jaunes médians n'atteignant pas le bord antérieur des segments. Tache apicale occupant la moitié aux deux tiers de la cellule r_4 32

Aucun des caractères susmentionnés 35

32. Tache noire sur la joue, au-dessus de la fossette tentoriale .... ***furcatus* Walker** (p. 99)

Joue toute jaune 33

33. Rangée sublatérale de taches noires étroites sur l'abdomen; triangles jaunes médians de dimensions moyennes. Triangle transparent dépassant la bifurcation de R_{4+5}, parfois atteignant R_{2+3} 34

Pas de rangée sublatérale de taches noires sur l'abdomen; triangles médians très petits, parfois atrophiés. Triangle transparent s'arrêtant à la bifurcation de R_{4+5} .... ***indus* Osten Sacken** (p. 102)

34. Tache apicale s'élargissant un peu dans le sens apical, ne traversant pas plus des deux tiers de R_4 et occupant la moitié de la cellule r_4 .... *luteopennis* **Philip** (p. 106)

Tache apicale manifestement élargie dans le sens apical, traversant la plus grande partie de R_4 et emplissant presque la cellule r_4 .... *montanus* **Osten Sacken** (p. 112)

35. Tache apicale emplissant au plus la moitié de la cellule r_4 36

Tache apicale emplissant toute ou presque toute la cellule r_4, s'étendant parfois jusque dans la cellule r_5 39

36. Joue tachée de noir à côté de la fossette tentoriale. Triangle transparent traversant R_{2+3} ..... *lateralis* **Wiedemann** (p. 104)

Joue toute jaune. Triangle transparent ne traversant pas R_{2+3} 37

37. Couleur de fond du thorax jaune ou brunâtre; rayures brunes assez brillantes .... *flavidus* **Wiedemann** (p. 93)

Thorax verdâtre ou gris-bleuâtre, orné de rayures noir brunâtre assez brillantes 38

38. Fémurs postérieurs principalement noirs. Premier tergite abdominal principalement noir. Marques abdominales plus foncées et habituellement accentuées. Partie basale de cua_1 de teinte foncée .... *pudicus* **Osten Sacken** (p. 121)

Fémurs postérieurs principalement jaunes. Premier tergite abdominal en grande partie jaune. Marques abdominales souvent fanées. Partie basale de cua_1 de teinte claire .... *celatus* **Pechuman** (p. 82)

39. Triangle transparent atteignant le bord costal et coupant la tache apicale de la bande transversale; tache apicale emplissant presque la cellule r_4, mais ne s'étendant pas au-delà. Espèce à la livrée jaune, ponctuée de taches noires, presque médianes, réunies sur le second tergite .... *geminatus* **Wiedemann** (p. 101)

Aucune combinaison des caractères précités 40

40. Triangle transparent atteignant effectivement ou presque R_{2+3} .... *pikei* **Whitney** (p. 119)

Triangle transparent dépassant à peine la bifurcation de R_{4+5} 41

41. Sur l'abdomen, rayure médiane jaune et bande longitudinale noire de part et d'autre; marge latérale des segments lisérée de jaune .... *macquarti* **Philip** (p. 107)

Abdomen jaune, ponctué d'au moins 4 rangées plus ou moins complètes de taches noires 42

42. Couleur de fond du thorax et scutellum jaunes .... ***vittatus* Wiedemann** (p. 132)

Couleur de fond du thorax verdâtre irisé ou gris-bleu; scutellum noir 43

43. Tache apicale emplissant complètement la cellule r_4. Rangées sublatérales de taches abdominales à peu près aussi foncées que les rangées médianes .... ***aberrans* Philip** (p. 70)

Tache apicale n'emplissant pas complètement la cellule r_4. Rangées ublatérales de taches abdominales plus pâles que les rangées médianes .... ***striatus* Osten Sacken** (p. 126)

Chrysops aberrans Philip

Figs. 130, 159; Map 4

Chrysops striatus Osten Sacken, 1875:391 (in part)
Chrysops aberrans Philip, 1941*a*: 122.

Female. Length 7–9 mm. Frons higher than broad, slightly wider below, yellowish gray pruinose, with subglossy black ocellar prominence; frontal callus usually yellow, with upper margin darkened, occasionally almost black. Scape, pedicel, and base of flagellum mostly yellowish; remainder of flagellum usually black. Clypeus and genae yellowish orange; clypeus lacking pruinosity. Palpus yellowish brown.

Thorax with prominent subshiny black and grayish blue to yellow pruinose longitudinal stripes on scutum and pleura. Scutellum dark brown to black, often with yellowish posterior margin. Legs mostly yellow; apex of fore tibia, mid and hind coxae, base of hind femur, and fore tarsus more or less blackened. Wing (Fig. 130) with cell br completely darkened; cell bm clear, with crossband narrowly reaching hind margin in cell m_3; apical spot broad, filling most of cell r_4.

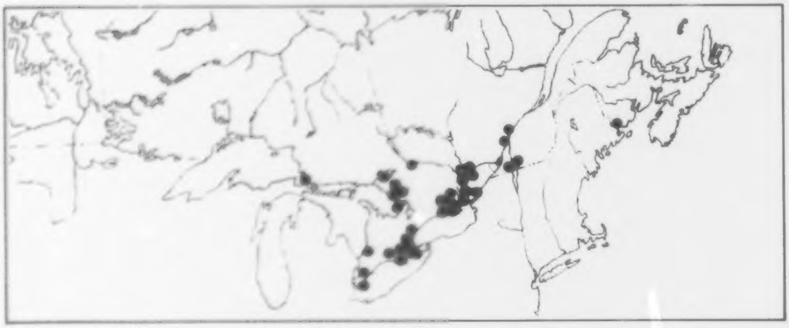
Abdomen dorsally yellow, with 4 longitudinal black stripes and with submedian stripes rarely joined on tergite 2 (Fig. 159). Sternites mostly yellow.

Male. Similar to female, but cell bm pigmented except at apex; submedian abdominal stripes usually joined on tergite 2.

Remarks. This species is a segregate of *C. striatus* Osten Sacken, and as expected, the two bear the closest resemblance. The characters given in the key should provide a ready distinction. The only other feature of diagnostic value not mentioned in the key is the sublateral abdominal stripes, which are as dark as the submedian stripes in *C. aberrans* but usually somewhat paler in *C. striatus*. One other species in the Canadian fauna having similar abdominal stripes is *C. vittatus* Wiedemann, but it is distinguished by the complete infuscation of cell CuA_1 and by its yellow scutellum.

Larvae of this species have been collected in a variety of semiaquatic habitats but are most commonly found in wet, sandy soil at the margin of permanent ponds and lakes (Teskey 1969). Pechuman (1981*a*) noted that adults of *C. aberrans* are most common in cattail marshes along Lake Ontario in New York, and there are a number of similar habitat records in Ontario.

Distribution. Southern Ontario and Quebec, with an apparently small disjunct population in southern New Brunswick (Map 4) that is connected through the northern United States from Minnesota and Missouri east to the New England States. The flight period of *C. aberrans* extends from late May to early September, but most collections have been made in July and early August.



Map 4. Collection localities of *Chrysops aberrans*.

Chrysops aestuans Van der Wulp

Figs. 106, 166; Map 5

Chrysops moerens Walker, 1848:201 (preocc. Fabricius, 1787).
Chrysops aestuans Van der Wulp, 1867:135.
Chrysops moerens var. *confusus* Krober, 1926:284.

Female. Length 8–10 mm. Frons nearly as high as basal width; frontal callus gray pruinose; ocellar prominence with glossy black border. Antenna black; scape and pedicel with mottling of reddish areas. Clypeus and gena yellow; clypeus without pruinosity. Palpus orange brown.

Thorax black with bluish gray pruinose longitudinal stripes. Legs nearly completely black to extensively orange. Wing (Fig. 106) with both basal cells clear; crossband extending across base of cell cua_1 to margin of cua_2 but not reaching hind margin; apical spot paler than crossband, narrower or no wider than cell r_1 at junction with crossband, and not widened distally.

Abdomen (Fig. 166) predominantly black dorsally; sides of first 2 tergites, median triangle, occasionally sublateral rows of triangles on tergites 2–5, and narrow posterior margins of tergites 3–6 grayish yellow; tergite 2 with sublateral black triangles often narrowly connected to median black. Sternites extensively blackened, or first 4 sternites yellowish orange, with median row of dark spots.

Male. Similar to female except as follows: Scape moderately swollen; clypeus with vestiges of median pruinose stripe; thorax and abdomen with paler coloration greatly reduced but characteristic pattern usually retained; both basal cells pigmented.

Remarks. *Chrysops aestuans* is most similar to *C. callidus* Osten Sacken in adult, larval, and pupal stages. Although the adults can usually be easily differentiated using the key characteristics, distinguishing their larval stage is often not possible.

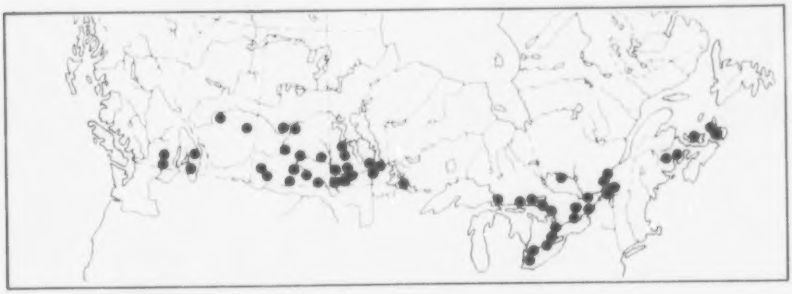
Philip (1941*a*) described as *C. aestuans* ssp. *abaestuans* some specimens from Kansas, Colorado, Utah, and Saskatchewan that differed from typical *C. aestuans* in the slightly greater width of the apical wing spot and in a reduction in the size of the sublateral black spots on tergite 2, resulting in their loss of contact with the median geminate spot. Because of the sympatry of these specimens with typical *C. aestuans*, there is little justification for subspecific recognition, and since the width of the apical spot may also vary to the other extreme of near absence, there seems to be no basis for formal recognition of these variants. In Canada, at least, there are better grounds for distinguishing two varieties on the basis of leg and ventral abdominal coloration. These structures in all specimens seen from west of the Great Lakes are extensively yellow, whereas east of the lakes, with few exceptions, they are predominantly black.

Dr. L.L. Pechuman (in litt.) has indicated that the population of this species south of the Great Lakes shows all gradations of the above-mentioned color differences.

Populations of *C. aestuans* in eastern Canada behave differently from those in western Canada. Pechuman (1981) observed that in New York the species is distributed mainly along Lake Ontario and the St. Lawrence River. This association with large bodies of water appears to apply in Ontario as well, and larvae have been reported only in cattail marshes on the shores of Lakes Ontario and Huron (Teskey 1969). In western Canada *C. aestuans* is more abundant, in some areas being a major pest. Here I have collected its larvae in soils associated with a variety of sites in which there was flowing and standing water that was sometimes quite alkaline. These differences should be investigated more thoroughly.

Cameron (1926) observed that egg masses of the western members of *C. aestuans* (as *C. moerens*) were laid on the undersides of leaves of a variety of emergent aquatic plants. The masses were elongate, flat, and single-tiered.

Distribution. *Chrysops aestuans* has been collected in all provinces except Newfoundland (Map 5). It is notably absent from the eastern end of Lake Superior to the Manitoba border and the Eastern Townships of Quebec. This is perhaps due to the absence of



Map 5. Collection localities of *Chrysops aestuans*.

suitable breeding habitats among the granitic rocks and coniferous forests of the Precambrian Shield. The distribution of *C. aestuans* in the United States extends from the eastern border of Vermont to Washington and Oregon, and south to Arizona.

The flight period of adults in Canada extends from early June to September, with peak abundance in early July.

Chrysops asbestos Philip

Figs. 126, 168; Map 6

Chrysops asbestos Philip, 1950*a*:455.

Female. Length 7–10 mm. Frons about as wide as high, grayish pruinose; frontal callus large, black; ocellar prominence and much of median occipital sclerite glossy black. Antenna slender; scape, pedicel, and first flagellomere mostly orange; remainder of antenna black. Clypeus and genae dark brown to black, with yellowish pruinosity, including median club-shaped band extending half the distance to oral margin.

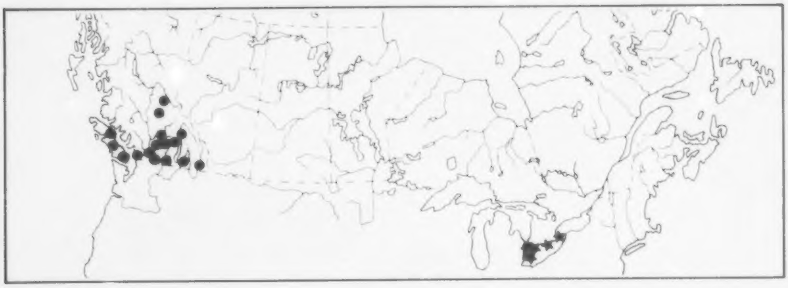
Thorax black, with faint scutal, and more obvious pleural, gray pruinose stripes and bright yellow hair. Legs mostly black; tibiae and basal tarsomeres more or less yellowish. Wing (Fig. 126) with cell br pigmented on basal two-thirds; cell bm mostly clear; crossband not reaching hind margin and extending through base of cell cua$_1$; apical spot slightly wider than cell r$_1$ at origin and expanded distally to enter apex of cell r$_4$ over about one-half of vein R$_4$.

Abdomen (Fig. 168) dorsally yellowish orange, with black spot below scutellum narrowly connected to anteromedian kidney-shaped black patch on tergite 2; tergites 3–6 prominently banded yellowish-orange and black. Sternites yellow; first 3 segments with progressively wider median black patches; remaining sternites similar to tergites.

Male. Very similar to female.

Remarks. This colorfully marked species is among the most distinctive of deer flies. It is closely related to *C. frigidus* Osten Sacken and *C. venus* Philip, the latter bearing the closest resemblance. However, no difficulty should be experienced in distinguishing adults of the three using the keys provided.

Teskey (1984) found larvae in mud both on the edges of a pond and in water channels through a beaver meadow, as well as in moss growing on fallen trees and limbs in open swamps.



Map 6. Collection localities of *Chrysops asbestos* (●) and *C. brunneus* (★).

Distribution. In Canada restricted to southern British Columbia (Map 6), extending south to California and east to western Montana and Wyoming. Collection dates range from late June to early August.

Chrysops ater Macquart

Fig. 96; Map 7

Chrysops ater Macquart, 1850:344.
Chrysops fugax Osten Sacken, 1875:375.
Chrysops carbonarius ssp. *nubiapex* Philip, 1955:92.

Female. Length 7–10 mm. Predominantly subshiny black. Frons slightly higher than wide, wider below, with frontal callus, large area covering ocelli, and much of median occipital sclerite glossy black. Antenna slender; scape and portion of pedicel yellow; flagellum mostly black. Clypeus with median grayish pruinose stripe half its length. Palpus black.

Thorax pale-haired, except on notopleural lobes and leg segments beyond coxae. Scutum with broad, faintly gray longitudinal stripe. Halter black. Wing (Fig. 96) darkly pigmented in costal cell, in all but apical quarter of basal cells, and in crossband; crossband with outer margin irregular and commonly not reaching hind margin of wing; cell CuA usually with basal clear lunule; cell r_1 often with faint pigmentation apically.

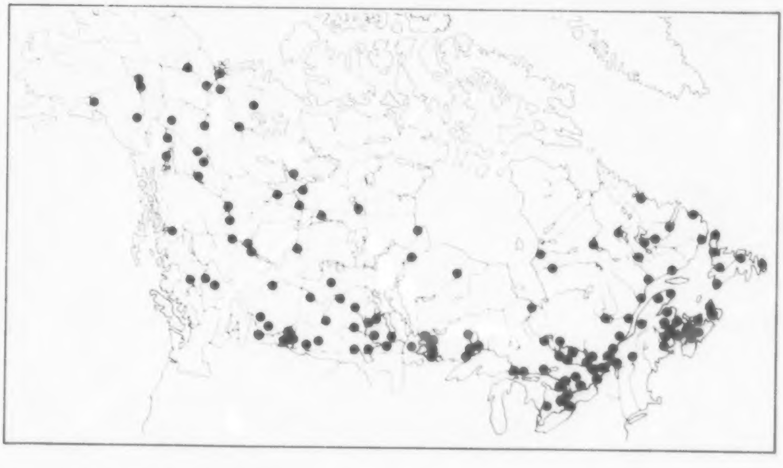
Abdomen usually white-haired on sternites and much of tergites; tergite 1 with inverted V of black hair; much of tergites 2 and 3 with black hair laterad of median triangular patches of white hair. However, some specimens, including the type specimen from Newfoundland, have golden hairs rather than white.

Male. Similar to female except as follows: Hair of head, thorax (usually including laterotergite), and all of first 3 tergites of abdomen black at base; outer margin of crossband irregular or bowed; faint apical spot occasionally visible along costal margin.

Remarks. Philip (1955) recognized this species earlier as a subspecies—*C. carbonarius* ssp. *nubiapex* Walker. I then elevated it (Teskey 1969) to specific rank, based on consistent differences in the morphology of the immature stages as well as on the adults. Pechuman (1972) recognized the priority of its present name.

Some specimens of *C. ater* may have the base of cell cua_1 almost fully infuscated and hence may be almost indistinguishable from *C. mitis* Osten Sacken.

Larvae have typically been found in mud or silt rich in organic matter on the margins of slow-flowing streams (Teskey 1969).



Map 7. Collection localities of *Chrysops ater*.

Distribution. This species has a generally northern distribution throughout all parts of Canada and Alaska south of the treeline, except for southern British Columbia (Map 7). In British Columbia it seems to be replaced by *C. noctifer* Osten Sacken. In the contiguous United States the species is found in the northern tier of that country, but it extends south to West Virginia in the east and to Utah and Colorado in the west.

Chrysops ater is abundant throughout much of its extensive range in the early season beginning in mid May, with peak abundance in early June, and is gone by early July.

Chrysops brunneus Hine

Fig. 129; Map 6

Chrysops brunneus Hine, 1903:44.

Female. Length 8–11 mm. Body and legs yellowish brown. Frons higher than wide, wider below, mainly grayish pruinose; frontal callus strongly inflated, mainly yellow, not pruinose; median ocellus with glossy brown denuded area below, that area usually connected to frontal callus. Antenna mainly yellow; terminal flagellomeres dark; scape and pedicel strongly inflated. Clypeus and genae yellow, with only the latter having sparse pruinosity. Palpus yellow.

Thorax with indefinite grayish yellow and dark brown longitudinal stripes on scutum and pleura; scutellum mainly yellow. Legs yellow; tarsi darker. Wing (Fig. 129) with pigmentation filling all but subapex of cell br and apical two-thirds of cell bm; crossband reaching hind margin in cells m_3 and cua_1 but pigment in centre of latter cell dilute; apical spot continuing around apex of wing, more dilutely posteriorly, to join crossband on posterior margin, thus enclosing linear clear area.

Abdomen yellowish brown, dorsally sometimes with darker shadows and faint median triangles, ventrally usually with median and sublateral darker brown stripes.

Male. Similar to female.

Remarks. *Chrysops brunneus* is distinctive in its dominant yellowish brown coloration and swollen basal antennal segments. Within the Canadian fauna only *C. fulvaster*, a western species, has a swollen scape and similar wing pattern but is readily distinguished by a prominent abdominal pattern and a median pruinose band on the clypeus.

Goodwin (1977) reared a larva collected in an Atlantic salt marsh. The species is obviously well-adapted to fresh water, since it is common near marshes bordering Lake Erie, Lake St. Clair, the St. Clair River, and the south shore of Lake Ontario (Map 6), the only localities in Canada where the species has been found.

Distribution. The continental distribution of *C. brunneus* is peculiar in hugging the Atlantic and Gulf coasts from New Jersey to Texas, exclusive of peninsular Florida, and then following a broad swath northward, generally following the Mississippi and Ohio rivers, thus avoiding the Appalachian highlands. It is active from late June to early August and can be troublesome to anyone frequenting the vicinity of lakeshore marshes.

Chrysops callidus Osten Sacken

Figs. 106, 146; Map 8

Chrysops callidus Osten Sacken, 1875:379.
Chrysops callidula Philip, 1941*a*:117.

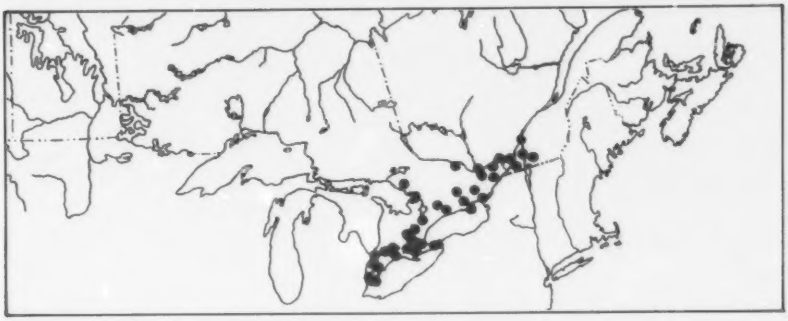
Female. Length 7–9 mm. Frons slightly higher than wide, grayish pruinose; frontal callus glossy dark brown to black; one or more ocelli with glossy spot beside them; occipital sclerite with subglossy dark median patch. Antenna slender; scape, pedicel, and basal flagellomere more or less orange; remainder of flagellum black. Clypeus, genae, and palpus yellow to orange; clypeus entirely glossy.

Thorax with usual subglossy dark longitudinal stripes on scutum and pleura; scutellum black. Legs mainly black; tibiae and basitarsi with some orange. Wing (Fig. 106) with basal cells hyaline; crossband not reaching hind margin, narrowly entering cell cua_1, with isolated pigmentation bordering CuA_2; apical spot no wider than cell r_1, entering only apex of cell r_4.

Abdominal tergites 1 and 2 broadly yellow laterally, with median black geminate spot enclosing median yellow triangle; tergites 3–6 black, narrow yellow caudal margins expanded into median triangles (Fig. 146). Sternites yellow, with progressively larger median black area on successive segments.

Male. Similar to female except as follows: Basal cells mostly infuscated; vestige of median pruinose stripe present on frontoclypeus; antennal scape moderately swollen; scutum darker, with median stripe narrower and submedian stripes iridescent bluish black.

Remarks. *Chrysops callidus* is a rather common species in southern and eastern Ontario. It is most similar to *C. aestuans* and *C. sackeni*. Although characters given in the key usually suffice for their distinction, the following subsidiary features are of value.



Map 8. Collection localities of *Chrysops callidus*.

Chrysops callidus has the frontal callus twice as wide as high; fore femur black; cell br infuscated on basal quarter. *Chrysops aestuans* has the frontal callus 1.5–1.75 times as wide as high; fore femur black or bicolored; cell br infuscated on basal quarter. *Chrysops sackeni* has the frontal callus 1.5 times as wide as high; fore femur yellow; cell br infuscated on basal third or half.

The larvae have been found only in wet mineral soils with moderate amounts of organic matter and on the margins of ponds and slow-flowing streams with almost no tall vegetation in the vicinity (Teskey 1969).

Distribution. In Canada the species is confined to southern and southeastern Ontario and adjacent parts of Quebec (Map 8), where it has been collected from the first week of June to early August. In the United States it extends from Maine to Illinois and south to Florida.

Chrysops calvus Pechuman & Teskey

Fig. 93; Map 9

Chrysops calvus Pechuman & Teskey, 1967:645.
Chrysops niger Macquart, 1838:165, in part.

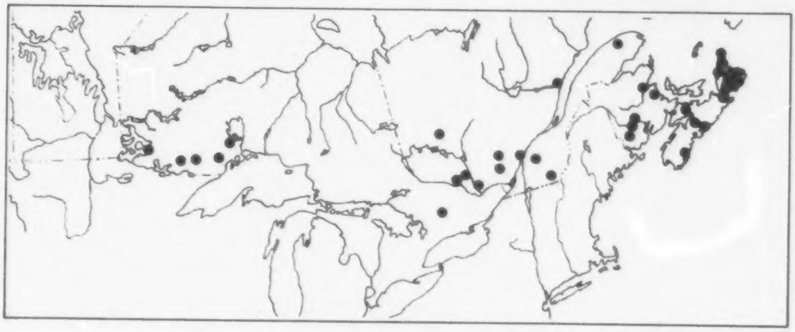
Female. Length 7–10 mm. Predominantly black. Clypeus and basal antennal segments glossy yellow; frontal callus, spot above tentorial pit, ventrolateral margin of head, vertex, and median occipital sclerite glossy black. Frons taller than wide. Antenna slender; scape predominantly reddish orange; pedicel partly yellow; flagellum black. Palpi black.

Thorax with usual black and grayish pruinose stripes on scutum and pleura; scutellum black; pleura with hairs whitish yellow. Legs black; fore and mid tibia with orange-shaded portions. Halter dark brown. Wing (Fig. 93) with cell br pigmented, except near apex; cell bm clear; crossband at most only narrowly reaching hind margin and not entering cell cua_1; apical spot absent.

Abdomen black, first tergite with posterolateral corner yellow; abdomen sparsely covered with black and white hairs dorsally. Sternites mainly white-haired; sternite 1 lacking hairs.

Male. Similar to female. Almost completely black, including all hairs, except on terminal abdominal segments. Clypeus, parts of genae and basal antennal segments yellowish orange; thoracic stripes inconspicuous, paler.

Remarks. Pechuman and Teskey (1967) differentiated this species from *C. niger* Macquart. The only reliable characters for separating the two in both adult and larval stages are given in the keys.



Map 9. Collection localities of *Chrysops calvus.*

Larvae have been found on only one occasion, namely, in saturated clay soil on the margin of a flood pool bordering a small stream (Teskey 1969).

Distribution. The Canadian distribution of this species is shown on Map 9, with collections having been made from early June to mid July. In the United States it is found in states bordering the Great Lakes and south to Florida between the Appalachian Mountains and the East Coast.

Chrysops carbonarius Walker

Fig. 95; Map 10

Chrysops carbonarius Walker, 1848:203.
Chrysops niger Macquart of Walker, 1848:202.

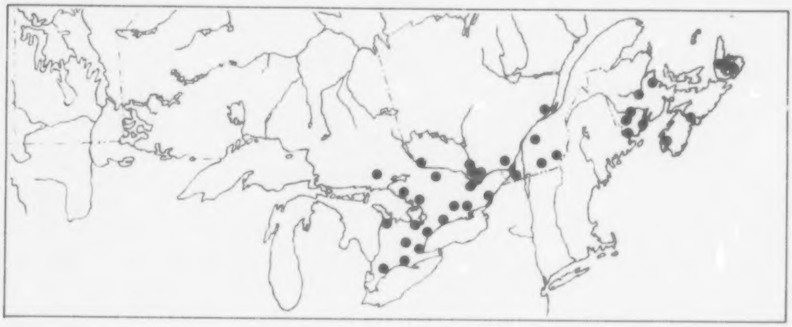
Female. Length 7–10 mm. Predominantly black. Frons higher than wide, very slightly wider below; frontal callus, large area covering ocellar prominence, and much of median occipital sclerite glossy black. Antenna slender; scape yellow; distal segments more or less blackened. Clypeus with median grayish pruinose stripe half its length. Palpus black.

Thorax subglossy black, with pale yellow hairs; scutum with broad faintly grayer median stripe, narrowly bordered by brownish pruinosity anteriorly. Legs black; mid and hind basitarsi yellowish. Halter black. Wing (Fig. 95) darkly pigmented in costal cell, in all but apical quarter of basal cells, and in crossband; crossband usually reaching hind margin of wing, its outer margin straight; cell cua_1 dilutely pigmented, except for prominent clear basal lunule; apical spot absent.

Abdomen entirely black; tergites with black and white hairs. Sternites with only white hairs.

Male. Similar to female except as follows: Scutal striping lacking; body hairs more extensively black.

Remarks. *Chrysops ater* Macquart is the only species with which *C. carbonarius* is likely to be confused. The taxonomic confusion between these two species is summarized in the remarks on the former. Although the characters given in the key will suffice to separate most specimens, there are sometimes doubtful determinations. I have seen evidence of hybridization of the two species involving larvae and adults.



Map 10. Collection localities of *Chrysops carbonarius*.

Larvae have typically been found in sand and gravel banks of swiftly flowing streams (Teskey 1969). This preference may explain the apparent absence of the species from southern Ontario, where the topography is such that streams are generally slow flowing and not associated with rock and gravel beds.

Distribution. Southeastern Canada from Ontario to the Maritime Provinces (Map 10) and south to Florida, Louisiana, and Georgia. Collection dates of Canadian specimens extend from late May to mid July and are in agreement with the observation of Pechuman (1981) in New York that the beginning of the flight period is 1–2 weeks later than for the very similar *C. ater*.

Chrysops celatus Pechuman

Figs. 117, 148

Chrysops flavidus ssp. *celatus* Pechuman, 1949:82.
Chrysops celatus Pechuman; Teskey, 1969:34.

Female. Length 7–10 mm. Predominantly yellow. Frons higher than wide, narrowed above, extensively gray pruinose; yellow frontal callus and small dark spots flanking ocelli denuded and glossy; occipital sclerites gray. Antennae slender, yellow; terminal flagellomeres black. Clypeus and much of gena glossy yellow. Palpus yellow.

Thorax grayish pruinose; scutum and pleura with prominent subglossy dark brown longitudinal stripes; scutellum dark brown, sometimes reddish posteriorly. Legs yellow; apex of fore tibia, fore tarsus, and apical tarsomeres of mid and hind legs darker. Halter dark brown. Wing (Fig. 117) with basal one-half and one-quarter of cells br and bm, respectively, pigmented; crossband reaching posterior margin in cell m_3; CuA_2 with isolated marginal infuscation; apical spot slightly wider than cell r_1 at base, expanding distally to fill about half of cell r_4.

Abdomen (Fig. 148) with tergites dull yellow; tergite 2 with darker yellow to light brown markings on broad inverted V; remaining tergites with transverse anterior bands; posterior margins of tergites incised medially. Sternites 1–4 mainly yellow and sternites 5–7 brown.

Male. Similar to female except as follows: Clypeus with short pruinose spur beneath antennae; wing with basal two-thirds and one-half of cells br and bm infuscated.

Remarks. The presence of this species in Canada is known from a series of specimens collected by R. Idema at Long Point, Ont., on 15 July 1965. It most closely resembles *C. flavidus* Wiedemann, the species under which *C. celatus* was originally described as a subspecies. The distinguishing feature given in the key is the only reliable one.

Our knowledge of the larvae of this species is based on collections in New Jersey and Alabama (Teskey 1969). They were found in such diverse habitats as almost pure sand bordering a small stagnant pond, highly organic soils in an abandoned cranberry bog, and around the roots of aquatic vegetation growing at the base of a cypress tree. A facsimile of the first two habitats can be found on Long Point.

Distribution. The distribution in the United States extends from New York, Michigan, and Wisconsin to Alabama.

Chrysops cincticornis Walker

Fig. 97; Map 11

Chrysops cincticornis Walker, 1848: 201.
Chrysops celer Osten Sacken, 1875: 376.

Female. Length 8–11 mm. Predominantly black. Frons about as high as wide, nearly parallel-sided, grayish pruinose; frontal callus large, glossy black; ocelli surrounded by denuded black areas connected to shiny denuded spot on median occipital sclerite. Antenna slender; scape, usually parts of pedicel, and basal flagellomere yellow to orange; remainder of antenna black. Clypeus with median pruinose band extending more than half the distance to oral margin. Palpus brownish black.

Thorax black; scutum and scutellum subshiny, the former with faint submedian paler stripes; thorax mostly white-haired; notopleural lobe, upper margin of anepisternum, and laterotergite with hairs bright yellowish orange. Legs mainly black; mid and hind metatarsi yellow. Halter brown. Wing (Fig. 97) with basal two-thirds of cell br and bm, costal cell, and crossband darkly pigmented; crossband with nearly straight anterior margin, reaching or nearly reaching hind margin of wing and entering basal half of cell cua_1.

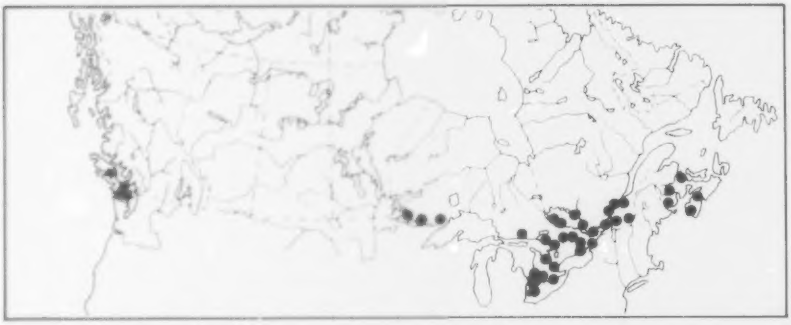
Abdomen black dorsally and ventrally; tergites 2 and 3 with posterior margin sometimes having faint median pale triangles.

Male. Similar to female except as follows: Blacker, mostly because of completely black hairs; antenna black; clypeal pruinose stripe narrower, but complete to oral margin; wing with pigmentation filling all but apical spots in cells br and bm and extending usually somewhat more dilutely into cells cu*p* and sometimes a_1.

Remarks. Some specimens of *C. cincticornis* have the upper pleural hairs only light yellow to cream-colored, which causes difficulty in their separation from *C. mitis* Osten Sacken. The extent of the wing crossband and the presence of pale hairs on the notopleural lobe usually indicate the correct identity in such circumstances. Larvae of *C. cincticornis*, described by Teskey (1969), are indistinguishable from those of *C. mitis*.

The species is common and sometimes annoying in southern and eastern Ontario but is much less prominent farther east. Pechuman (1981*a*) observed this species depositing brown, several-tiered egg masses on emergent vegetation above the water surface of a stream. Larvae have been found in a wide variety of habitats, including saturated moss, silt, clay, and sand on the margins of stagnant or freshwater ponds, lakes, and slow-flowing streams (Teskey 1969).

Distribution. Except for an isolated population in extreme southwestern Ontario, this species has been collected only south of 47° N latitude in the remaining eastern parts of Canada (Map 11). Previous reports of the species in Saskatchewan and Manitoba (Philip 1947, 1965) could not be verified and are assumed to be misidentifications. In the United States *C. cincticornis* is present in all states east of the Mississippi River except Florida, where the typical form is replaced by a subspecies. Its flight period in Canada extends from late May to August, with peak numbers near the end of June.



Map 11. Collection localities of *Chrysops cincticornis* (●) and *C. coloradensis* (★).

Chrysops coloradensis Bigot

Fig. 113; Map 11

Chrysops coloradensis Bigot, 1892·605.

Female. Length 8–10 mm. Frons about as high as wide, usually slightly wider below; frontal callus mostly yellowish orange; dorsal margin narrowly black; ocellar prominence extensively glossy black. Antenna slender; scape, pedicel, and basal flagellomere more or less orange, especially basally; terminal flagellomeres black. Clypeus and gena mostly glossy yellow. Palpi yellow.

Thorax with distinct bluish gray and glossy black longitudinal stripes in usual pattern. Legs mostly yellow. Halter dark brown. Wing pigmentation (Fig. 113) filling basal two-thirds and one-quarter of cell br and bm; crossband narrowly reaching hind margin in cell m_3 and narrowly bordering cua_2; apical spot as wide as cell r_1 at juncture with crossband and widening distally to cross about one-half to two-thirds of R_4.

Abdomen yellow with prominent black markings, with pattern dorsally similar to Fig. 167; sternites yellow; sternites 1 to 4 or 5 with median and sublateral rows of black spots, the median spots progressively wider; terminal sternites black; posterior margins narrowly yellow.

Male. Similar to female but much darker. Other differences as follows: Thorax black with indistinct stripes. Femora and apices of fore and hind tibiae black. Wing with both basal cells mostly infuscated. Abdomen predominantly black dorsally; sides of first three tergites narrowly yellow; caudal margins with median and sublateral pale triangles. Sternites with median black spots enlarged. Body having mostly black hairs.

Remarks. This species is most similar to *C. furcatus* Walker, which has, in addition to the distinguishing characters given in the key, the legs darker, with at least portions of the fore and hind femora and tibiae black. Also, in *C. furcatus*, the wing crossband does not reach the hind margin of the wing, and the hyaline triangle crosses R_1.

Single-tiered egg masses were observed to be deposited on floating leaves of pondweed, *Potomogeton* spp., in permanent ponds. Larvae were found in saturated, moss-covered soil on the margin of such ponds (Lane 1975). Adults are insignificant as pests of humans.

Distribution. Northern Baja California to Colorado and north to British Columbia. In British Columbia the species is apparently restricted to Vancouver Island and islands of the Georgia Strait (Map 11). Collections have been made from mid June to early September.

Chrysops cuclux Whitney

Figs. 101, 140; Map 12

Chrysops cuclux Whitney, 1879:35.

Female. Length 7–10 mm. Predominantly black. Frons as wide as high, nearly parallel-sided; frontal callus large, subquadrate; ocellar prominence and median occipital sclerite entirely glossy. Antenna slender; scape yellow; pedicel and flagellum more or less black. Palpus black, except for yellow base. Clypeus with median pruinose band half the distance to oral margin.

Thorax with scutum subshiny; pleura lightly pruinose, white to yellow-haired. Legs black; base of mid and hind basitarsi yellow. Halter brown. Wing pigmentation (Fig. 101) pale, covering basal half to two-thirds of basal cells; crossband not reaching posterior margin of wing; wing apex clear.

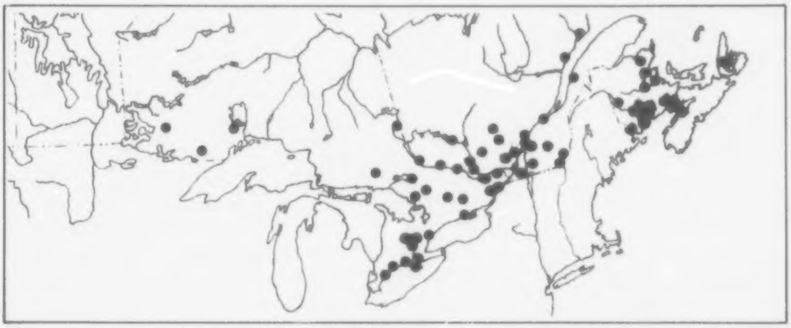
Abdomen (Fig. 140) black; tergites 1 and 2 with sides narrowly yellow; tergite 2 often with faint median pale triangle.

Male. Similar to female except as follows: Clypeal stripe pruinose, complete to oral margin; most body hairs longer and black; wing with basal cells two-thirds pigmented, sometimes with faint apical spot.

Remarks. Females of this species show greatest similarities in wing infuscation to *C. ater* Macquart and in body coloration to *C. sordidus* Osten Sacken. However, the pallid wing pattern, lacking an apical spot, and the lateral abdominal pale spots on the first two tergites readily distinguish the species.

Adults of this species rarely occur in large numbers and thus are not serious pests. Larvae have typically been found in saturated soil on stream margins having little vegetation (Teskey 1969).

Distribution. The species occurs from western Ontario to Cape Breton (Map 12) and in adjacent states south to South Carolina. It is on the wing in Canada from late May to mid July.



Map 12. Collection localities of *Chrysops cuclux*.

Chrysops dawsoni Philip

Figs. 99, 141, Map 13

Chrysops dawsoni Philip, 1959:196.

Female. Length 7–10 mm. Head dark brown to black, extensively glossy on vertex, median occipital sclerite, large frontal callus, and much of clypeus and gena; clypeus with median pruinosity not reaching oral margin. Frons square. Antenna slender; scape and at least median face of pedicel yellow; remainder of antenna dark brown to black, sometimes with reddish tinge. Palpus brown.

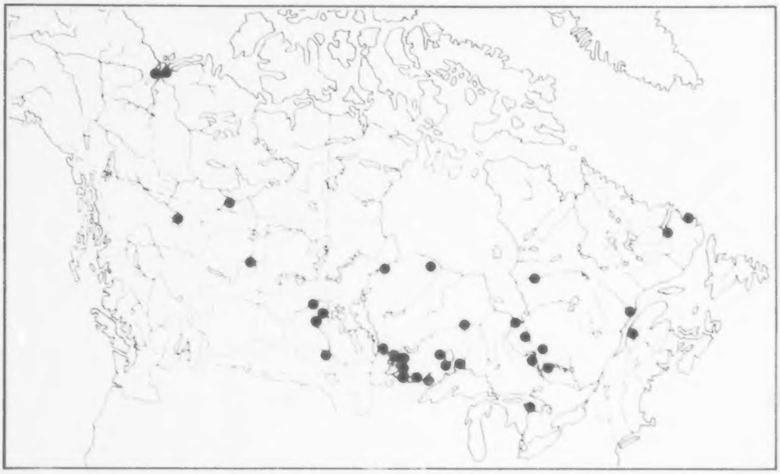
Thorax greyish pruinose on pleura and laterally on scutum; remainder of scutum and scutellum subglossy black; scutum usually faintly striped anteromedially. Legs completely black or with base of fore and mid tibia and base of mid and hind metatarsi yellow to reddish. Halter brown. Wing (Fig. 99) with basal two-thirds of cells br and bm pigmented; crossband nearly reaching hind margin and entering basal half or more of cell CuA_1; outer margin nearly straight; apex of wing clear.

Abdominal tergites 1 and 2 yellow to orange on lateral one-quarter to one-third, with solid black, nearly parallel-sided median stripe lacking enclosed paler pruinose areas, although median triangles of pale hairs may be faintly evident; remaining tergites black (Fig. 141). Sternites similarly colored, except sides of sternites 1 and 2 sometimes narrowly blackened.

Male. Darker than female, including legs, most hairs, scape, and upper pleural surfaces; sides of one or more of first 3 tergites yellow to orange; median clypeal stripe complete to oral margin; clear apical spots in cells br and bm smaller.

Remarks. This species was considered a variant of *Chrysops excitans* Walker until Philip (1959) gave it specific status. The taxon is relatively easy to differentiate based on the lack of a median pale pruinose triangle on tergite 2. The generally smaller size of specimens of *C. dawsoni* also lends credence to its specific status. However, the very similar wide distribution of the two species in Canada (Maps 13, 15), with both repeatedly collected in the same series, suggests that *C. dawsoni* may only be a variant of *C. excitans*. A solution to this puzzle might come with discovery of the larva of *C. dawsoni*.

Distribution. Yukon Territory to Labrador (Map 13), south to northern Minnesota, Wisconsin, and Michigan. Its flight period also seems to be similar to *C. excitans*.



Map 13. Collection localities of *Chrysops dawsoni*.

Chrysops delicatulus Osten Sacken

Fig. 105; Map 14

Chrysops delicatulus Osten Sacken, 1875:380.

Female. Length 7–9 mm. Frons slightly higher than broad; frontal callus black, dorsally rounded; ocellar prominence partly or completely surrounded by glossy brown integument. Antennae slender, mostly yellow to reddish; terminal four flagellomeres black. Clypeus entirely glossy yellow; gena partly glossy yellow, with dark spot above tentorial pit. Palpus slender, brown.

Thorax brownish black and gray striped. Legs dark brown; base of fore tibia, most of mid tibia, mid and hind metatarsi, and occasionally fore coxa yellowish. Halter brown. Wing (Fig. 105) with cells br and bm mostly clear; crossband more dilute or fenestrate in base of cell d, sometimes narrowly reaching hind margin along M_3 and covering only distal edge of cell M_3; apical spot narrower than cell R_1 at junction with crossband and only slightly widened distally.

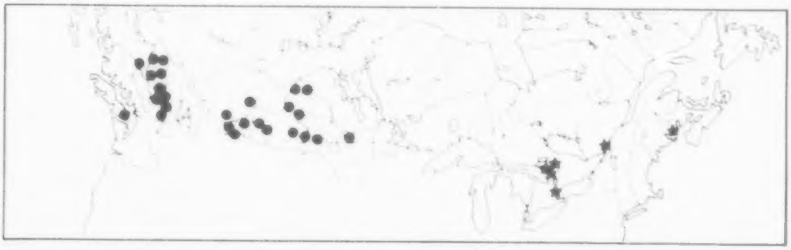
Abdomen with tergites mostly black; sides of tergites 1 and 2, median triangular spots posteriorly on tergites 1–4, and narrow bands on posterior margins of tergites 3–6 yellow. Sternites 1 and 2 yellow, sometimes with small median dark spots; remaining sternites black, with hind margins yellow.

Male. Similar to female except as follows: Clypeus sometimes with narrow ragged pruinose line; upper eye facets greatly enlarged. Wing with basal two-thirds and one-half of cells br and bm pigmented; abdomen with posteriorly emarginate black patches on tergites 2–4; black patches not reaching hind margins, one-third width of tergite 2, and only slightly wider on tergites 3 and 4.

Remarks. *Chrysops delicatulus* is most similar to *C. aestuans*, *C. callidus*, and *C. sackeni* in abdominal pattern and in the slender apical wing spot. However, it is readily differentiated from these species by the clear basal half of cell d.

Larvae of *delicatulus* were collected in a cedar swamp and an abandoned cranberry bog in the pine barrens of New Jersey (Teskey 1969). This region has generally acidic soils, as evidenced by the extensive commercial production of cranberries in the area. Of the Canadian collection localities of adults, two are known to be acidic sphagnum bogs.

Distribution. Collections of this species in Canada are few (Map. 14). The species is known in Michigan and upstate New York but is apparently more common in states bordering the Atlantic, from Maine to Delaware, with a disjunct population in South Carolina. It has a very disjunct distribution. Collection dates of Canadian specimens are in the latter half of July.



Map 14. Collection localities of *Chrysops delicatulus* (★) and *C. discalis* (●).

Chrysops discalis Williston

Figs. 136, 155; Map 14

Chrysops discalis Williston, 1880:245.

Female. Length 8–11 mm. Pale yellow and gray with black markings. Head integument black above antennae, yellow below, except for black spots laterally on clypeus; head extensively covered by gray pruinosity. Frons with frontal callus black, half the width of frons; ocellar area glossy black; triangular glossy black patch on median occipital sclerite. Antenna slender; scape and pedicel yellow ventromesally, darker laterally; flagellum mostly black. Clypeus with median pruinose stripe reaching oral margin. Palpus yellow.

Thorax prominently striped in gray and black in usual manner on both pleura and scutum; scutellum black, pruinose. Legs yellow; only joints and apical tarsal segments darkened. Halter knob brown. Wing (Fig. 136) with prominent fenestrated pattern; wing pigmented in all but apical spot of cell br, all of cell bm, extensive basal areas in cells cu*p* and a_1, centre of cells d and cua_1, and central connecting spots from cell r_3 to m_2.

Abdomen dorsally with submedian and sublateral rows of black spots; tergite 2 with submedian pair of spots often united anteriorly, forming a geminate figure larger than isolated sublateral spots; submedian and sublateral spots joined anteriorly on other tergites (Fig. 155). Sternites yellow, with progressively larger median and sublateral black spots.

Male. Differing from most *Chrysops* in eyes separated on frons by width of an ocellus and differing from female as follows: antenna black, with scape moderately swollen; scutum blacker, with longitudinal paler stripes obscure; wing with infuscation darker and also present on posterior border of cell bm and bordering cell cu*p*; abdomen darker, making restricted pale areas most prominent.

Remarks. The distinctive fenestrate wing pattern with infuscation absent from the centre of some cells, especially cell d, is also present in *C. fulvaster*. The relative size of the antennae will readily distinguish the two.

Chrysops discalis inhabits the dry grasslands of western North America. The larvae have been found in alkaline lake and slough margins, sometimes in very high numbers (Cameron 1926; Philip 1941*d*; Teskey 1985). In the vicinity of such breeding areas the flies can be extremely troublesome to humans and animals. The species has been implicated in the transmission of tularemia (Frances and Mayne 1921).

Distribution As indicated, this species inhabits the southern prairie regions of Manitoba, Saskatchewan, and Alberta and the dry Okanagan and Williams Lake–Kamloops area of British Columbia (Map 14), as well as geographically similar parts of the United States, from Nebraska to Colorado and California. The seasonal distribution in Canada extends from late May to early August.

Chrysops excitans Walker

Figs. 100, 164; Map 15

Chrysops excitans Walker, 1850:72.

Female. Length 9–12 mm. Frons nearly square, with extensive dark brown to black glossy areas; glossy areas including large subquadrate frontal callus, most of vertex to eye margins, and extensive integument on median occipital sclerite. Antenna slender, yellow basally, darker apically. Palpus brown. Clypeus with median pruinose band extending half its length.

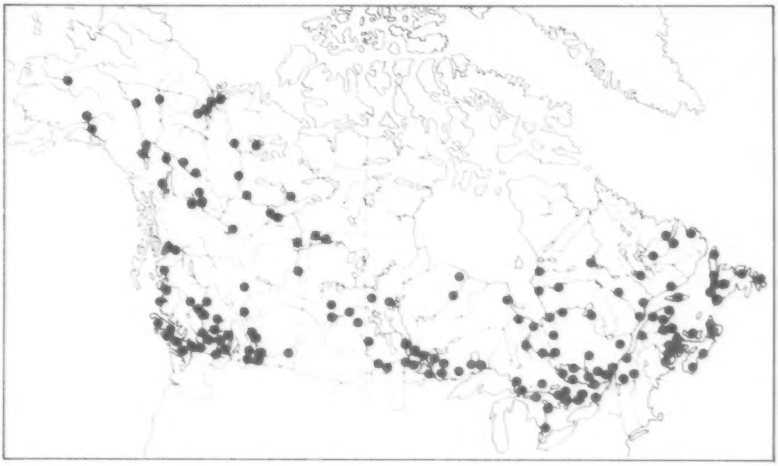
Thorax black with yellow hair, glossier dorsally; scutum with faint stripes. Legs black or with base of tibiae and metatarsi reddish. Halter brown. Wing (Fig. 100) with basal one-half to two-thirds of cells br and bm pigmented; crossband with anterior margin bowed or uneven, not reaching hind margin, and entering base of cell cua_1; apical spot absent.

Abdomen with sides of first 2 or 3 tergites yellowish orange; median area black, at least on tergite 2, with a pale pruinose triangle (Fig. 164). Anterior sternites mostly orange, with black median spots; posterior sternites darker.

Male. Similar to female except as follows: Thorax and abdomen almost completely black, including hairs; tergites 1 and 2 occasionally with small yellow lateral patches; cells br and bm and anterior of cell cup pigmented.

Remarks. This species is the commonest, most widely distributed, and most troublesome deer fly in the northern boreal regions of Canada. It is readily distinguished by the clear apex of the wing, pruinose stripe on the clypeus, and distinctive abdominal pattern. Only *C. dawsoni* Philip might be confused with it. The relationship of these two species is discussed under *C. dawsoni*.

Teskey (1969) described the immature stages. Larvae were collected in moss and other vegetation on the margins of marshy lakes, bog ponds, and woodland swamp pools.



Map 15. Collection localities of *Chrysops excitans*.

Distribution. The species is present in all provinces and territories of Canada, and in Alaska (Map 15), occupying a rather typical Canadian and Hudsonian zone distribution, with a somewhat isolated southwestern extension to California. In the east it reaches New Jersey and West Virginia. Its flight period extends from early June to the end of August.

Chrysops flavidus Wiedemann

Fig. 116

Chrysops flavidus Wiedemann, 1821:55.
Chrysops pallida Macquart, 1838:166.
Chrysops canifrons Walker, 1848:197.
Chrysops pallidus Bellardi, 1859:73 (preocc. Macquart, 1838).

Female: Length 8–10 mm. Extensively yellow with brown markings. Head integument mainly yellow; lateral occipital sclerites gray; apical flagellomeres usually black. Frons slightly higher than wide, narrowed above; frontal callus large; ocellar area with denuded yellow spots flanking ocelli. Clypeus and gena extensively glossy.

Thorax yellowish gray pruinose, with brown subglossy longitudinal stripes in usual pattern. Legs yellow; apex of fore tibia, fore tarsus, and apical tarsomeres of mid and hind legs darker. Halter light brown. Wing (Fig. 116) with basal one-half and one-quarter of cells br and bm pigmented, respectively; crossband reaching hind margin in cell M_3, crossing base of cell cua_1, and bordering vein cua_2; apical spot slightly wider than cell R_1 at junction with crossband and slightly widened distally to cross one-half to two-thirds of vein R_4.

Abdomen with indefinite pattern of yellow and brown, the yellow comprising most of tergite 1 and the brown forming submedian oblique markings on tergite 2 and more nearly transverse bands on remaining segments. Sternites predominantly yellow; anterior margin of last few sternites usually darker.

Male. Similar to female except for cells br and bm, respectively, two-thirds and one-half pigmented.

Remarks. This species is similar to *Chrysops celatus*. The two were once considered to be conspecific. Their separation seems assured, however, based on coincident differences in larvae and adults (Teskey 1969). Adult separation can be achieved by color differences in thoracic striping and between median and lateral occipital sclerites.

Distribution. Only one Canadian specimen is known, collected from Pelee Island in southern Ontario, on 18 June. This is a logical northern terminus of a range that covers all of eastern North America south of a line from Long Island, N.Y., to Ohio and southern Nebraska.

Chrysops frigidus Osten Sacken

Figs. 128, 154; Map 16

Chrysops frigidus Osten Sacken, 1875:384.
Chrysops canadensis Krober, 1926:277.
Chrysops frigidus ssp. *xanthas* Philip, 1950*a*:453.

Female. Length 6–9 mm. Head grayish pruinose with dark brown to black glossy denuded areas; latter areas including large frontal callus, portion of ocellar prominence and median occipital sclerite, and lateral portions of clypeus adjacent to abbreviated median pruinose stripe. Frons higher than basal width, slightly widened below. Antenna slender; scape more or less yellowish; pedicel and flagellum dark brown to black with paler tinges. Palpus yellowish brown.

Thorax black, with lateral margin of scutum and much of pleural surface greyish pruinose and yellow-haired. Legs variable in color, from dominantly yellow with dark tibia–femoral joints and portions of tarsi to entirely dark brown or black. Wing (Fig. 128) with cells br and bm partly pigmented; crossband rarely reaching hind margin, filling base of cell cua_1, and extending dilutely into apex of cell a_1; apical spot broadly united to crossband, but filling only anterior half of cell r_4.

Abdomen with extent of black and yellow coloration variable, similar to variation in leg coloration; first 2 tergites usually yellowish orange laterally; first tergite with median lunate black mark below scutellum, this black mark narrowly reaching hind margin of tergite 1 and meeting a broader than long posteriorly emarginate black figure on tergite 2; remaining tergites black, with narrow paler hind margins often slightly expanding medially to appear as faint median pale spots or triangles (Fig. 154). Extremes of variation of this basic pattern involve the following: reduction of pale coloration on first 2 tergites to small lateral spots; tergum appearing black with faintly paler hind margins; yellowish orange on tergum expanding, especially laterally, the black being confined to progressively larger median anterior portions of tergites 1–5. Sternites similarly variable, from almost completely dark to first 5 sternites yellowish orange, with intermediate conditions showing progressive changes in median blackness.

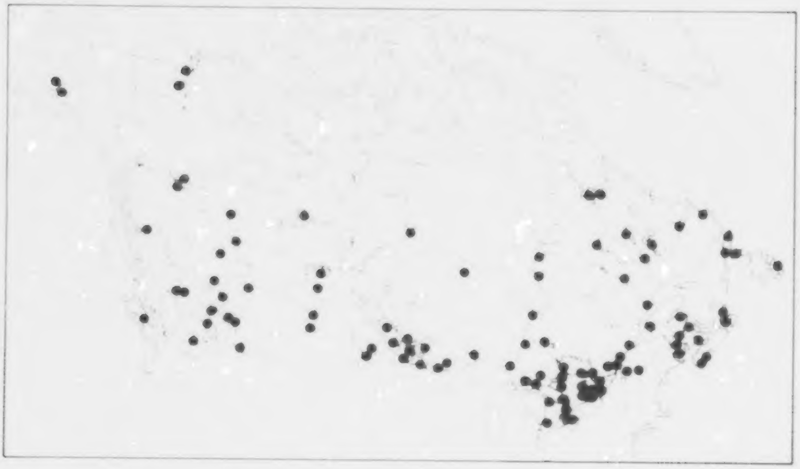
Male: Similar to female except as follows: Scape moderately swollen, wider than flagellum; clypeal pruinose stripe complete to oral margin; wing with greater pigmentation of cells br, bm, a, and r_4; median black marking on tergite 2 squarer, more broadly connected to black on tergite, and not emarginate posteriorly.

Remarks. The paler extreme of coloration of adults coincides with what Philip (1950*a*) described as *C. frigidus* ssp. *xanthas*. Since this variant occurs in many populations of the typical form across the country, it cannot be recognized as more than a variety.

This species is relatively common and widely distributed across Canada, but nowhere does it appear to be a troublesome pest. It is most commonly collected in swampy woodlands.

Larvae have been found in a great variety of wetland habitats but almost invariably in a substrate of moss (Teskey 1969).

Distribution. This species is present in all provinces and territories of Canada, as well as in Alaska (Map 16) and adjacent northeastern United States; there is a southern extension along the Rocky Mountains to Colorado. Collection dates range from late May to early September, but most were made through the latter half of June and all of July.



Map 16. Collection localities of *Chrysops frigidus*.

Chrysops fuliginosus Wiedemann

Fig. 135; Map 17

Chrysops fuliginosus Wiedemann, 1821:59.
Chrysops plangens Wiedemann, 1828:210.

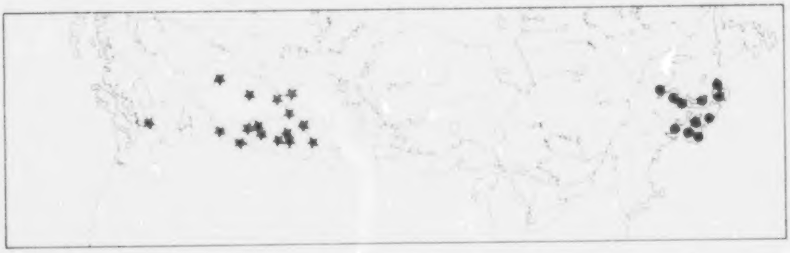
Female. Length 6–8 mm. Predominantly black. Frons slightly higher than broad, slightly wider below; frontal callus black, moderately inflated, with dorsal and ventral margins angulate or curved; ocellar prominence and median occipital sclerite partly glossy black. Antenna dark brown to black, with inner face of scape, inner face of pedicel, and base of flagellum reddish. Clypeus glossy yellow. Gena with glossy dark brown areas nearly reaching eye margin. Palpus dark brown.

Thorax gray pruinose, predominantly pale-haired; notopleura often with some black hairs; thorax with narrow median brownish stripe; scutum with sublateral wider more glossy stripes; pleura with indistinct median and dorsal faintly grayer bands. Legs dark brown to black, base of fore tibia and all of mid and hind tibiae and metatarsi reddish yellow. Halter dark brown. Wing (Fig. 135) with pigmentation dilute, filling all but apical spot in cell br and absent from cell bm; crossband broadly reaching hind margin in cells m_3 and cua$_1$; apical spot less than width of cell R_1 at junction with crossband, but abruptly widened distally to include much of cell r_4 and, in base of this cell, meeting projection of anterior margin of crossband, thus crossing fork of R_4 and isolating a narrow clear patch in middle of cell R_3 and part of R_1.

Abdomen grayish black; tergites with posterior margins often faintly paler; tergites 2 and 3 with posterior margins expanded to form faint median triangles.

Male. Similar to female except as follows: Darker, with black hair on all but posterior margins of last 3 visible tergites. Scape moderately swollen. Wing pigmentation also nearly filling cell bm; apical spot dilutely filling portions of cells r_5, m_1, and m_2 distad of crossband.

Remarks. This species is restricted to the immediate vicinity of east coast marine salt marshes and is readily distinguished from the few other *Chrysops* frequenting such areas by its drab dark coloration with almost no body markings and the dilutely infuscated wing pattern, characterized by a broad apical spot covering all of cell R_4, but with an enclosed oblique hyaline area anterior to fork of R_{4+5}. Teskey (1969) redescribed larvae reported found in wet soils of such marshes by Jamnback and Wall 1959.



Map 17. Collection localities of *Chrysops fuliginosus* (●) and *C. fulvaster* (★).

Distribution. This species has been found in salt marshes from the Bay of Chaleur, Gaspé Peninsula, Que. (Thomas 1980), to Florida. Additional Canadian records include Kouchibouguac National Park, N.B., and Lockeport, N.S. (Map 17). The collections from the Maritime Provinces were all made in July.

Chrysops fulvaster Osten Sacken

Figs. 134, 152; Map 17

Chrysops fulvaster Osten Sacken, 1877:221.

Female. Length 6–8 mm. Dull yellow and brown. Frons wider than high, widened below, frontal callus suboval yellow to marginally black; ocelli surrounded by glossy black. Median occipital sclerite sometimes with black ventral angle. Antenna yellow, except for dark apical flagellomeres; scape swollen. Clypeus glossy yellow, with median pruinose band. Gena with subgenal glossy area partly black. Palpus yellow.

Thorax yellow-haired; scutum and pleura with relatively distinct longitudinal stripes. Legs mainly yellow; mid and hind coxal and tibio-femoral joints, apex of fore tibia and tarsus, and apical tarsomeres of mid and hindleg darker. Halter yellow. Wing (Fig. 134) pigmented in about basal one-third and one-half of cells br and bm, respectively; crossband broadly reaching hind margin in cells m_3, cua_1, and a_1 strongly fenestrated, with base of cell r_2 and centres of cells d and cua_1 more or less clear; apical spot united narrowly with crossband in cell r_1, but extending around apex of wing to enclose crescent-shaped clear area in middle of cells from r_1 to m_2.

Abdomen dorsally (Fig. 152) grayish yellow, with black spot below scutellum; tergite 2 with median pair of oblique black spots sometimes joined anteriorly, and occasionally with minute sublateral black spots; remaining tergites mostly black, with narrow yellow lateral and posterior margins expanding to median triangles nearly crossing tergites and with small sublateral yellow spots; sternites 1–3 or 4 yellow laterally, with progressively larger median dark areas; sternites 5–7 black.

Male. Similar to female except as follows: Much darker, nearly black; integument lacking grayish pruinose overtones; fore coxa and tibia black; wing cells at most only weakly fenestrated; cells br and bm pigmented, except for subapical clear spots; abdomen with only small lateral areas of yellow on tergites 1 and 2 and with reduced median triangles extending to about half the length of tergites.

Remarks. This species is readily distinguished from other *Chrysops* by the combined features of a median pruinose band on the frontoclypeus, scape more distinctly swollen than other antennal segments, and dilute infuscation along entire posterior margin of the wing.

The species is distributed in the dry western prairie or plains region. Adults apparently do not venture far from small sluggish streams and associated swampy areas, where the egg masses and larvae have been found (Cameron 1926; Lavigne and Bloom 1968; Teskey 1985). Adults can be abundant and very annoying in such localized sites. Although no mention is made of the water quality in the first two publications, Teskey (1985) reports larvae of *C. fulvaster* only in relatively fresh water. They have not been found in obviously alkaline habitats.

The egg masses were laid in a single tier of many overlapping, shingled rows on the underside of *Potamogeton* and *Sagittaria* leaves.

Distribution. *Chrysops fulvaster* has been recorded in the prairie regions of Saskatchewan and Alberta, with one southern British Columbia record (Map 17), and in corresponding regions of the United States between North Dakota and Idaho, south to Oklahoma and California. Most adult collections were made in late June and July, but there are single May records for British Columbia and Saskatchewan.

Chrysops furcatus Walker

Figs. 114, 167; Map 18

Chrysops furcatus Walker, 1848:199.
Chrysops lupus Whitney, 1904:205.
Chrysops furcatus ssp. *chagnoni* Philip, 1955:106.

Female. Length 7–10 mm. Yellowish orange and black. Frons slightly higher than broad, wider below; frontal callus large, black; ocellar prominence with extensive black glossy area. Median occipital sclerite centrally glossy black. Antenna slender, mainly black, except scape, usually parts of pedicel, and sometimes basal flagellum with yellow or orange portions. Clypeus entirely glossy yellow. Gena with glossy areas black, nearly reaching eye margin. Palpus brown.

Thorax distinctly gray and black striped, yellow-haired. Legs usually with fore coxa, base of fore femur, and much of mid and hind tibia, femora, and basitarsi yellow; remainder of legs blackish, but sometimes almost completely black. Halter dark brown. Wing (Fig. 114) with basal half of cell br pigmented and cell bm clear; crossband filling only basal half of cell cua_1; apical spot nearly separated from crossband but expanded distally to cross apical half of R_4.

Abdomen dorsally (Fig. 167) with black area below scutellum joined to nearly parallel-sided median geminate figure on tergite 2, enclosing median yellow triangle; median yellow triangle extending less than half the length of tergite; sides of tergites 1 and 2 broadly yellow; tergite 2 occasionally with small black sublateral spots; tergites 3–7 black anteriorly, with yellow posterior margins; yellow posterior margins expanding on tergites 3–5 into median and often sublateral triangles that sometimes bisect the tergites; yellow coloration sometimes so extensive as to reduce black on tergites 3–5 to small submedian and minute lateral spots, or lateral spots absent. Sternites 1 to 4 or 5 extensively yellow, with median or sublateral black spots, or both; median spots progressively larger; remaining sternites black with narrow yellow posterior margins.

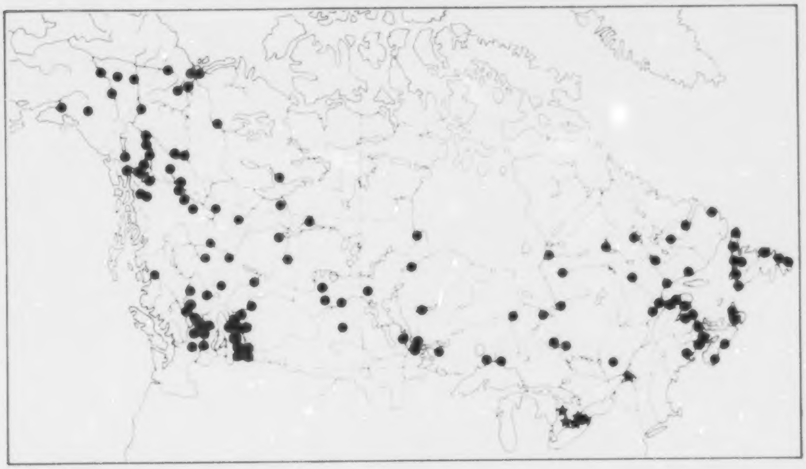
Male. Similar to female except as follows: Scutum nearly black, except for sublateral pale stripes; scutum predominently pale-haired, as in female; wing with cells br and bm pigmented, except at apex; apical spot covering three-quarters of vein R_4; abdomen with median black figures on tergites 1 and 2; tergites 1 and 2 broader, lacking constriction at segmental border, tapered posteriorly; tergite 2 with enclosed median yellow spot shallower than on following tergites; sublateral black on tergites 3–5 tending to greater reduction.

Remarks. In body coloration and wing pigmentation pattern males and females bear a close resemblance to such species as *C. proclivis* Osten Sacken, *C. coloradensis* Bigot, *C. montanus* Osten Sacken, and *C. lateralis* Wiedemann. However, *C. furcatus* can be readily differentiated from these species by the clear apex of cell br, the hyaline triangle crossing R_{2+3}, and the apical spot broadening distally to cover about half of R_4.

Philip (1955) applied the name *C. furcatus* ssp. *chagnoni* to darker variants in which the legs are primarily black, with abdominal tergite 2 having sublateral black spots and the remaining tergites showing little or no evidence of sublateral yellow spots. Such variants, although seemingly more abundant among Labrador populations, are present throughout much of the species' broad range. It is apparently for this reason that the name was later given variety status (Philip 1965).

Larvae have been collected in saturated peaty clay soils and pure moss at Moosonee, Ont., and Churchill, Man. (Teskey 1969) and subsequently in several locations in Alberta and British Columbia. The last two habitats were equally diverse, with the only apparent common factors being a saturated substrate and the presence of much organic matter.

Distribution. This species has a typical Hudsonian distribution south of the treeline, through the boreal forest zone, with an extension into the Canadian zone, especially in the Maritime Provinces (Map 18), and a strong western montane extension to Colorado and eastern California. Adult collections have been made from mid June to mid August, with the majority in July.



Map 18. Collection localities of *Chrysops furcatus* (●) and *C. geminatus* (★).

Chrysops geminatus Wiedemann

Figs. 109, 149; Map 18

Chrysops geminatus Wiedemann, 1828:205.
Chrysops fallax Osten Sacken, 1875:392.
Chrysops geminatus var. *impunctus* Krober, 1926: 301.

Female. Length 5–8 mm. Yellow and dark brown. Frons slightly higher than broad, wider below; frontal callus reddish to dark brown, two-thirds as high as wide, rounded above; ocellar prominence sparsely brown pruinose, more or less completely, flanked laterally and ventrally by glossy brown; median occipital sclerite glossy brown ventrally. Antenna slender; scape, pedicel, and base of flagellum yellowish; remainder dark brown. Clypeus glossy yellow. Gena with glossy areas brown, nearly reaching eye margin. Palpus yellow.

Thorax prominently striped in yellowish gray and dark brown to black in usual pattern. Legs usually with front coxa and femur, apex of mid femur, base of fore tibia, all of mid tibia, and mid and hind basal tarsomeres yellowish; remainder of legs dark brown. Halter brown. Wing (Fig. 109) with cells br and bm almost completely clear; crossband reaching hind margin in cell m_3, occasionally invading cell

cua_1; apical spot nearly separated from crossband but expanding apically to include most of cell r_4.

Abdomen (Fig. 149) with tergites 1 and 2 predominantly yellow; tergite 1 with brown patch below scutellum; tergite 2 with oblique pair of submedian brown spots usually not reaching either margin and often narrowly connected to each other anteriorly to form an inverted V; tergites 3–5 dark brown anteriorly, with narrow yellow posterior margins and median yellow stripe, and often with sublateral yellow spots sometimes dividing the black into 4 rows of spots. Sternites 1 and 2 yellow; sternites 3 and 4 with progressively larger median and lateral dark spots; sternites 5–7 predominantly dark.

Male. Similar to female except as follows: Cell br nearly half pigmented; submedian paler scutal stripes darker than sublateral pale stripes; abdomen more extensively yellow, with tergites 3 and 4 usually with dark coloration reduced to 4 spots.

Remarks. *Chrysops geminatus* is one of the smallest species of the genus and is also distinctive by the apical spot of the wing being moderately widened apically and almost separated from the crossband and usually by an inverted V-shaped black marking on an otherwise yellow second abdominal tergite. The species is most similar to *C. lateralis* Wiedemann.

Larvae have been found abundantly in moss growing in spring-fed drainage beds and in some common, less distinctive habitats (Teskey 1969).

Specimens lacking the black markings on tergites 1 and 2 have been recognized as a separate species, *C. impunctus* Krober, whose type specimen is from Port Stanley, Ont. However, all gradations in the extent of these black markings have been found throughout much of the range of *C. geminatus*, which would indicate that *C. impunctus* is merely a variant of *C. geminatus*.

Distribution. In Canada the species is restricted to southern Ontario and Quebec (Map 18) and occurs in most of the United States east of the Mississippi River. Collections in Canada have all been made in July.

Chrysops indus Osten Sacken

Figs. 122, 147; Map 19

Chrysops indus Osten Sacken, 1875:383.
Chrysops pilumnus Krober, 1926:278.

Female. Length 7–10 mm. Frons about as high as greatest width, wider below; frontal callus suboval, reddish to black; ocellar prominence bordered with similarly colored denuded glossy patches. Median occipital sclerite with large central glossy area. Antenna slender, yellow basally; apical flagellomeres black. Clypeus and gena dominantly glossy yellow with small areas of pruinosity only on gena. Palpus yellow.

Thorax almost completely pale-haired, striped in usual manner, with submedian paler scutal stripes less prominent than sublateral pale stripes and those on pleura. Legs predominantly yellowish orange; apex of fore tibia and tarsus, mid and hind coxae, and apical tarsomeres black. Halter knob dark brown. Wing (Fig. 122) with cell br pigmented, except for subapical clear spot; crossband dilutely reaching hind margin in cell m_3 and dilutely crossing middle of cell cua_1 into apex of cell cu*p*; apical spot basally nearly as wide as cells r_2 and r_3, not expanded apically and thus filling only anterior third of cell r_4.

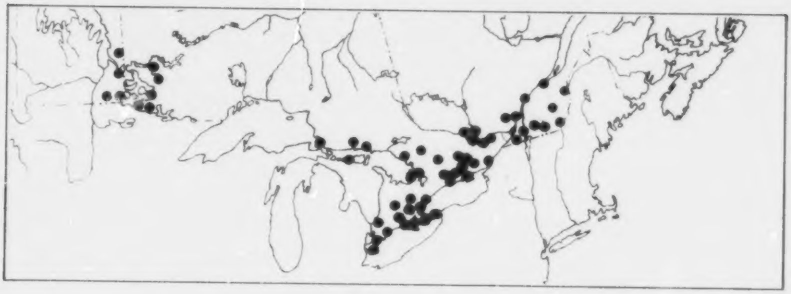
Abdominal tergites (Fig. 147) orange, with black markings involving median subquadrate patch below scutellum and connected to geminate or inverted U-shaped figure on tergite 2; following tergites with progressively wider sublateral black stripes as a continuation of arms of bigeminate figure on tergite 2 and bordering median orange stripe started on tergite 2; tergal hairs black and yellow, coinciding generally with similar integument color. Sternites 1–4 yellow, with sublateral black bars; sternites 5–7 progressively darker on anterior margin.

Male. Similar to female except as follows: Darker, with longer, mostly black hair on head, thorax, and abdomen; scutum with submedian paler stripes obsolete. Wing with pigmentation nearly filling cells br and bm and more extensive in cells cua_1 and cu*p*. Legs with front coxae and often margin of all tibiae black. Abdomen dorsally with yellow color restricted to lateral quarter of tergites 1–4 and to narrow posterior margins of tergites 3–7; tergites 3 and 4 with margins expanding into narrow median triangles.

Remarks. This species should not be difficult to identify and is among the most common in southern and eastern Ontario (Teskey 1960; Golini and Wright 1978). It can be aggressive and annoying to both humans and livestock.

Larvae have been found in many localities in a great variety of substrates (Teskey 1969) but most frequently in mineral soils having a moderate organic matter content.

Distribution. The western Ontario and Manitoba population (Map. 19) is a northern extension from the United States, where the species is present in all states bordering the Great Lakes and south to Virginia. The flight period extends from late May to early August, with most collections made in June.



Map 19. Collection localities of *Chrysops indus*.

Chrysops lateralis Wiedemann

Figs. 108, 153; Map 20

Chrysops lateralis Wiedemann, 1828:209.
Chrysops hilaris Osten Sacken, 1875:391.

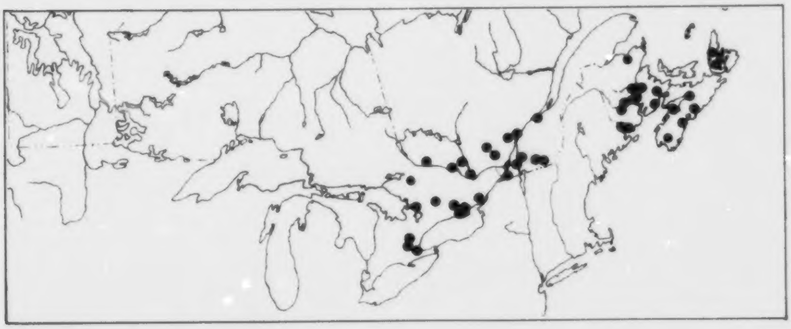
Female. Length 8–10 mm. Yellowish orange and black. Frons higher than wide, nearly parallel-sided; frontal callus dark brown to black, subquadrate; vertex diffusely glossy black, connected to extensive glossy area on median occipital sclerite. Antenna slender; scape, base of flagellar enlargement, and, to a lesser extent, pedicel yellowish orange; remainder of antenna black. Clypeus glossy yellow. Gena with usual glossy areas mostly black. Palpus yellow.

Thorax prominently striped in usual manner, pale-haired. Legs with fore coxa, fore and mid tibia, apical third of hind tibia, base of fore femur, much of mid and hind femora, and mid and hind basitarsi yellowish orange. Halter dark. Wing (Fig. 108) with cells br and bm pigmented only basally; crossband narrowly failing to reach hind margin and not entering cell cua_1; apical spot nearly detached from crossband, with hyaline triangle reaching vein R_1 but widening apically to cover more than half of vein R_4 and filling about half of cell r_4.

Abdomen (Fig. 153) with first 2 tergites mostly yellowish orange; tergite 1 with 2 dark spots behind scutellum in line with 2 narrow black longitudinal submedian lines on tergite 2; tergites 3 and 4 narrowly yellowish orange on lateral and ventral margins; tergite 2 with continuous median stripe and with sublateral black areas having central yellow spot usually connected to posterior yellow border and appearing as 4 rows of black spots; tergites 5–7 black, with narrow yellow posterior borders and partial median stripe on tergite 5. Sternites 1 and 2 yellow; sternites 3–5 yellow, with median and sublateral black marks; sternites 6 and 7 black, with yellow posterior margins; sternites 3–5 with median black marks broader than sublateral spots and progressively larger on successive sternites.

Male. Similar to female except as follows: Clypeus with short pruinose triangle below antennae; cell br with basal half to three-quarters pigmented; pigmentation of cell br sometimes faintly extending to apex of cell along anterior margin.

Remarks. This species is very similar to *C. geminatus* but is larger. Apart from the difference in wing infuscation mentioned in the key, *C. lateralis* has the paired submedian black bars on the second abdominal tergite more nearly parallel and not as oblique. Adults are locally abundant and can be quite a pest.



Map 20. Collection localities of *Chrysops lateralis*.

Larvae have been found in well-shaded muck soils of woodland meadows, a boggy backwater of a river, and a pool in a river flood channel (Teskey 1969).

Distribution. Niagara Peninsula east to southern Quebec, New Brunswick, and Nova Scotia (Map 20) and south to New York and the New England States to Maryland and West Virginia. Its flight period is basically restricted to July, with an occasional record in the weeks before and following that month.

Chrysops luteopennis Philip

Fig. 111

Chrysops luteopennis Philip, 1936*a*:159.

Female. Length about 8 mm. Yellow and black. Frons slightly higher than greatest width, slightly wider below; frontal callus rounded dorsally, yellow with dorsal margin black; each ocellus with black spot on outer margin. Median occipital sclerite with ventral angle black. Antenna slender, mainly black; scape, base of flagellum, and median face of pedicel yellowish. Clypeus and gena yellow. Palpus yellowish brown.

Thorax pale-haired; scutum and pleura with distinct longitudinal grayish and black stripes in usual pattern; legs with fore coxae, fore and mid femora, basal half of fore tibia, all of mid and hind tibia, and mid and hind basitarsi yellow; remainder of legs black. Halter black. Wing (Fig. 111) with cell br fully pigmented, although more diffusely posteroapically; crossband dilutely reaching hind margin in cell m_3, not or only dilutely invading cell cua_1; apical spot as wide as cell r_1 at junction with crossband and entering only tip of cell r_4 apically.

Abdomen with prominent yellow and black pattern dorsally comprising subquadrate black spot as wide as scutellum on tergite 1, the black spot connecting with geminate black figure on tergite 2, with small isolated black spots sublaterally; tergites 3 and 4 with similar median geminate figure and sublateral elongate black spots sometimes narrowly joined anteriorly to median figure; tergites 5–7 black; with hind margins narrow, yellow. Sternites 1–5 yellow, with progressively larger median black spots anteriorly; sternites 2–5 with sublateral row of narrow black bars; sternites 6 and 7 black, with yellow hind margins.

Male. Similar to female except as follows: Thorax extensively black, lacking submedian gray stripes and longer hairs; scutum with numerous black hairs. Wing with pigmentation nearly filling cells br and bm and dilutely filling cell cua_1 and apex of cell cu*p*; apical spot slightly wider than cell r_1, basally and crossing one-half of R_4.

Abdomen with longer and more abundant black hairs; tergite 1 with black pattern extending to anterolateral corners, but otherwise pattern both dorsally and ventrally similar to female.

Remarks. Philip (1936*a*) placed *C. luteopennis* in his *C. furcatus* group. The similarity of *C. luteopennis* to these species, of which only *C. furcatus*, *C. proclivis*, and *C. coloradensis* are known in Canada, is particularly evident in the abdominal pattern. However, the wing features given in the key distinguish all of them. In addition, *C. luteopennis* is relatively more slender-bodied and its wing infuscation is paler and faintly orange, which is indicated by its specific name.

Distribution. *Chrysops luteopennis* is a rare species, collected in only five localities, two of them in Ontario, at Perth Road, Frontenac County, and Port Royal, Norfolk County, and the remainder in Minnesota, Michigan, and Ohio. The Ontario specimens were collected in late June and early July. The Perth Road site is an incipient sphagnum bog, and the flies were swept from low vegetation in a quaking part of the bog.

Chrysops macquarti Philip

Figs. 132, 162; Map 21

Chrysops macquarti Philip, 1961:161.
Chrysops univittatus, of authors, not Macquart.

Female. Length 6–8 mm. Yellow and dark brown to black. Frons slightly higher than greatest width, prominently widened below; frontal callus dark brown, nearly oval; ocellar prominence irregularly glossy brown adjacent to ocelli. Median occipital sclerite with large glossy spot ventrally. Antenna very slender; scape yellow; pedicel and base of flagellum yellow or brownish; remainder of flagellum black. Clypeus and gena predominantly glossy yellow, often with diffuse darker area above tentorial pit. Palpus yellow.

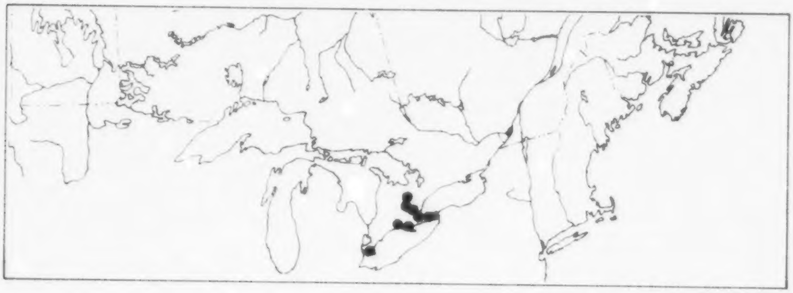
Thorax pale-haired, with moderately distinct grayish blue and black longitudinal stripes in usual pattern; scutellum black basally and yellow marginally. Legs mainly yellow; mid and hind coxae, apex of fore tibia, and fore tarsus darkened. Halter dark brown. Wing (Fig. 132) with pigmentation dark, filling cell br; crossband extending to hind margin in cell m_3 but not entering cell cua_1; apex of vein cua_2 with dilute spot; apical spot filling most of cell r_4, apex of r_5, and anterodistal tip of m_1; hyaline triangle usually barely crossing vein R_4 and R_5 but occasionally reaching beyond middle of cell r_2.

Abdomen (Fig. 162) with tergite 1 extensively yellow; tergites 2–5 usually with prominent median yellow stripe bordered by dark brown sublateral stripes of variable width, but sometimes almost absent, leaving abdomen predominantly yellow; tergites 6 and 7 more or less extensively darkened.

Male. Similar to female except as follows: Tentorial pits with larger more intense brown spots above; scutum lacking submedian pale stripes; wing with cell bm half pigmented.

Remarks. In the literature before 1961 this species was mistakenly called *C. univittatus* Macquart, a name that Philip (1961) showed should have been applied to another species then known by the name *C. wiedemanni* Krober. *Chrysops macquarti* is the replacement name given for this species.

Chrysops macquarti is most conspicuous by its parallel-sided, median, yellow abdominal stripe and the yellow apex of the scutellum. The stripe shows little of the jagged-edged appearance of other species, except for *C. univittatus*. *Chrysops univittatus* has a similar evenly margined stripe but differs by the remainder of the abdomen being substantially black. Larvae have been found in sandy, silty, or muck soils of usually small, slow-flowing streams (Teskey 1969). Adults seem to be locally abundant. In one such site, near Erin, Ont., a spring-fed seepage slope where larvae had been found, flies were abundant and ferocious; a few hundred metres away there were none.



Map 21. Collection localities of *Chrysops macquarti*.

Distribution. This species has been found in southern Ontario (Map 21) and most of the United States generally east of the Mississippi River, except southern Florida and northern Maine. Collection dates range from 11 June to 25 August, with most species collected in July.

Chrysops mitis Osten Sacken

Fig. 98, Map 22

Chrysops mitis Osten Sacken, 1875:387.

Female. Length 8–11 mm. Mainly black, with areas of white pruinosity and pale hairs; scape, pedicel, and base of flagellum yellow. Frons nearly square; large frontal callus, large area at vertex, and most or all of median occipital sclerite glossy black. Antenna slender. Clypeus glossy black, with abbreviated median pruinose stripe; gena with extensive area glossy black; palpus black.

Thorax predominantly white-haired; scutum with sparse black hairs and with two indistinct submedian narrow pale stripes, the stripes most evident anteriorly; notopleuron with dominant black hairs; anepisternum sometimes yellow-haired. Legs black; mid and hind metatarsi paler. Wing (Fig. 98) with basal two-thirds of cell br and bm pigmented; crossband rarely extending beyond basal half of cell m_3 and dilutely crossing base of cell cua_1; apical spot absent.

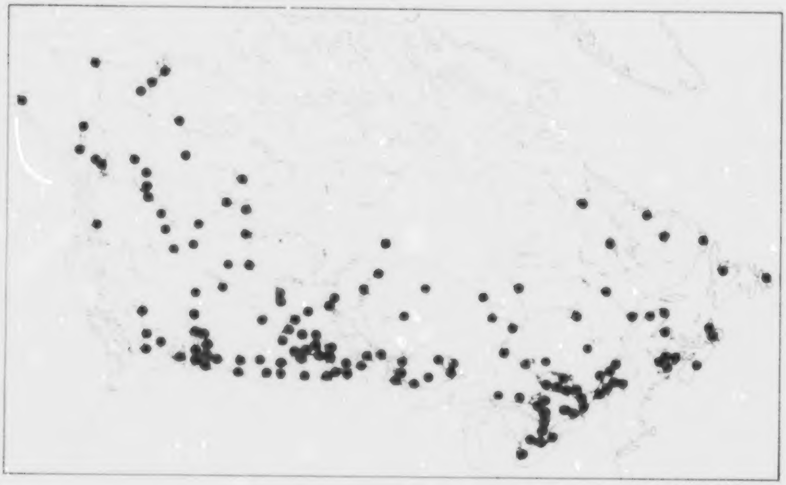
Abdomen black dorsally and ventrally; tergites 2–4 usually with faintly paler median pruinose triangles.

Male. Similar to female, except as follows: Blacker because of black hairs on all parts of body except apical abdominal segments; wing with pigmentation more extensive, covering all but apical spots in cells br and bm and often parts of cell cu*p* and a_1.

Remarks. This species is most closely related to *C. cincticornis*, based on all life stages, but adults of both sexes of *C. mitis* tend to be more similar to *C. ater* Macquart, from which greater difficulty in distinction sometimes may occur.

Eggs are deposited in three- or four-tiered masses on emergent vegetation, commonly cattails (Cameron 1928; Pechuman 1981*a*). Larvae have been found in saturated moss, silt, and decaying vegetation on the edges of old beaver ponds, woodland pools, alder swamps, and cattail marshes (Teskey 1969).

Distribution. The species has a transcontinental north-temperate distribution covering most of Canada and Alaska south of the treeline (Map 22) and the northern tier of eastern states of the



Map 22. Collection localities of *Chrysops mitis*.

United States; in the west it extends south along the mountain chains to Colorado. Adults begin emergence in late May and are most active through June and early July; a few specimens may be collected in September.

Chrysops moechus Osten Sacken

Figs. 133, 160; Map 23

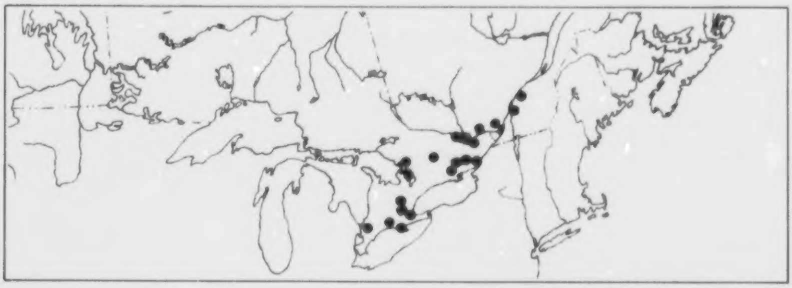
Chrysops moechus Osten Sacken, 1875:387.

Female. Length 7–8 mm. Yellow and black. Frons nearly as wide as high, widened below; frontal callus brown to black, pointed dorsally; ocellar prominence with indefinite darkening. Median occipital sclerite with small glossy black area. Antenna slender; scape, pedicel, and base of flagellum yellow; remainder of flagellum black. Clypeus and gena mostly yellow, dominantly glossy; subgena blackened. Palpus pale yellowish brown.

Thorax with normal pattern of longitudinal scutal stripes moderately prominent, the submedian stripes more intensely bluish gray than the lateral pale stripes; hairs pale; scutellum mostly yellow, with median dark spot anteriorly. Legs dominantly yellow; at least portion of hind femora, fore tibia, and tarsomeres black. Halter dark brown. Wing (Fig. 133) extensively and darkly pigmented anteriorly and distally to cells bm and cua_2, except in apices of cells m_1 and m_2.

Abdomen dorsally (Fig. 160) more or less predominantly yellow; tergites 2–4 usually with submedian and sublateral narrow longitudinal black stripes; tergites 5–7 mostly black; tergites 3–4 sometimes with submedian and sublateral stripes more or less extensively joined posteriorly or, at other extreme, black stripes almost absent. Sternites similarly variable in extent of yellow and black coloration, from yellow restricted to first 3 or 4 sternites, with median and sublateral black areas progressively larger, to yellow occupying almost all of anterior 5 sternites; sternite 5 and all of 6 and 7 with posterior margin black.

Male. Quite different from female. Completely black except as follows: clypeus yellow; genae brown; diagonal yellow pruinose band below tentorial pits; mid tibia and mid and hind basitarsi yellowish; abdomen sometimes with small lateral yellow spots. Wing pigmented in all of cell bm, in all but apical triangle in cell cua_1, in most of cell cu*p*; anal cell dilutely pigmented.



Map 23. Collection localities of *Chrysops moechus.*

Remarks. Most females of *C. moechus* are similar to *C. macquarti* Philip and may be distinguished only by the extent of the hyaline triangle and the partly blackened hind femur. The body pattern of *C. moechus* is quite variable; in some cases the sublateral black abdominal marking is reduced to a series of rather pallid dashes, which is not at all like *C. macquarti*.

Males of *C. moechus* are readily identified by their black coloration, in part a result of the almost complete wing infuscation.

Eggs are laid on the lower surface of leaves of trees overhanging riffles in streams (Pechuman 1981*a*). The egg masses are distinctive in that individual eggs are deposited vertically in a single tier and not overlapped in a shingled manner as in most *Chrysops* egg masses. Larvae have been found in silt trapped between stones on a stream bed and in soil heavily mixed with leaf mold on the margin of a stream (Teskey 1969).

Distribution: In Canada restricted to southern and eastern Ontario and southern Quebec (Map 23). This is the northern tip of an extensive range covering most of the United States east of a line from Minnesota to Oklahoma. Adults have been collected from mid June to mid August.

Chrysops montanus Osten Sacken

Figs. 118, 151; Map 24

Chrysops montanus Osten Sacken, 1875:382.

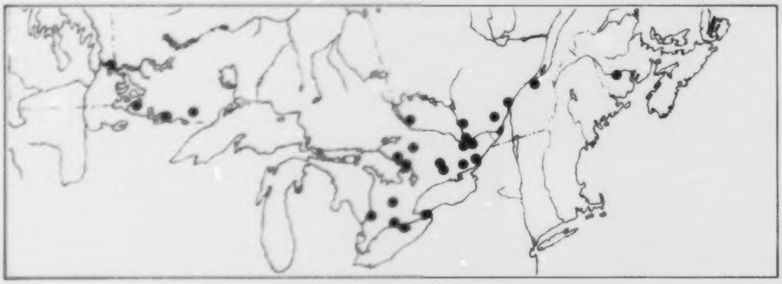
Female. Length 8–10 mm. Yellow and black. Frons slightly higher than greatest width, usually slightly wider below; frontal callus large, dark brown to black; dorsal ocelli with small glossy black spots laterad. Median occipital sclerite with small ventral glossy patch. Antenna slender; scape, pedicel, and base of flagellum yellowish to red; remainder of antenna black. Clypeus and gena entirely yellow, with minimum of pruinosity.

Thorax with longitudinal striping prominent; submedian paler scutal stripes more blue than other pale stripes. Legs predominantly yellow; mid and hind coxae, base of hind femur, apex of fore tibia, fore tarsus, and apical tarsomeres of mid and hind leg usually black. Halter knob dark brown. Wing (Fig. 118) with basal one-third to one-half of cell br pigmented; crossband reaching hind margin in cell m_3, narrowly entering margin of cell cua_1, and with pigmentation bordering vein CuA_2, leaving centre of cell cua_1 more or less clear; apical spot usually crossing more than half of vein R_4 to fill at least half of cell r_4, but in some specimens apical spot not as wide; hyaline triangle usually not reaching vein R_{2+3}.

Abdomen (Fig. 151) yellow; tergite 1 with black spot below scutellum; tergite 2 with geminate or inverted V shape black mark and often sublateral black spots; tergites 3–5 with 4 rows of black spots; tergites 6 and 7 black, with yellow posterior margins. Sternites 1–4 completely yellow or with progressively larger median and sublateral black spots; sternites 5–7 predominantly or completely black.

Male. Similar to female except as follows: Submedian scutal stripes less contrasting. Wing with pigmentation filling all but apical spot in cells br and bm and dilutely filling cell cua_1 and anterior border of cell *cup*. Abdomen darker by expansion of median black on tergite 1, by extension laterally along anterior margin, and by presence of sublateral row of dark spots; tergites 2–4 with median black geminate figures nearly one-third the width of tergites, enclosing small yellow triangles.

Remarks. The abdominal pattern, consisting of median orange triangles and rounded sublateral orange spots that are most evident on tergites 3–5 and that break the black areas into 4 rows of spots, is distinctive of this species and of *C. furcatus* Walker, *C. coloradensis* Bigot, and *C. proclivis* Osten Sacken. The last three have either a western or more northerly distribution. However, *C. montanus* is readily distinguished from them and from other species by the wing markings. Larvae have been collected in the muddy banks of a stream and on the margin of a pond (Teskey 1969). Adults are said to be most common in the vicinity of ponds and lakes.



Map 24. Collection localities of *Chrysops montanus*.

Distribution. This species has been found from southeastern Manitoba to New Brunswick (Map 24) and much of the United States east of a line joining Minnesota and Louisiana. The flight period extends from late June to mid August.

Chrysops niger Macquart

Fig. 94; Map 25

Chrysops niger Macquart, 1838:165.

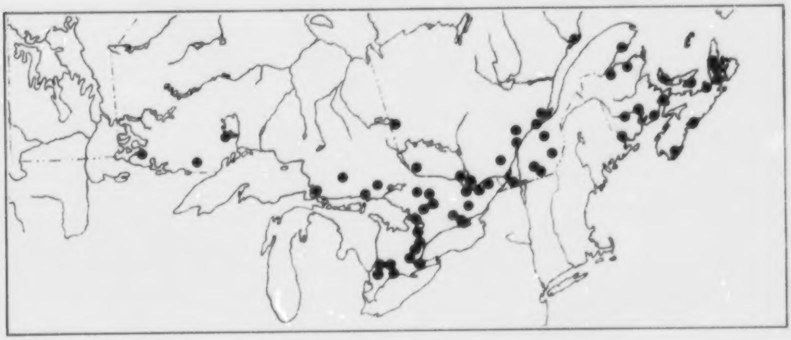
Female. Length 7–10 mm. Dark brown to black. Frons three-quarters as wide as high, slightly wider below than above; frontal callus large, black, separated from eye margin; ocelli in centre of nearly square shiny black area nearly reaching eye margin, with anterolateral corner slightly produced ventrolaterally; median occipital sclerite with shiny black patch near ventral angle. Antenna slender; scape yellow; pedicel more yellowish medially; flagellum mostly black. Clypeus glossy orange; adjacent area of gena above tentorial pits and subgenal area glossy brown to black. Palpus dark brown.

Thorax dominantly white-haired; scutal striping relatively inconspicuous and pale areas dull; median and sublateral black stripes nearly subequal in width and degree of gloss; scutellum black. Legs mainly black; mid and hind basitarsi yellow. Halter dark brown. Wing (Fig. 94) with cell br pigmented except near apex; cell bm hyaline; crossband usually narrowly reaching posterior wing margin and usually occupying all of cell m_3; apical spot absent.

Abdomen entirely dark brown to black, with black and white hair.

Male. Similar to female except as follows: Black hairs dominant on all parts of body except terminal abdominal segments; pale scutal stripes almost completely suppressed; scape of antenna moderately swollen; all posterobasal portions of wing pigmented, except small connecting clear spots in cells br, bm, cua, and bm.

Remarks. Although *C. niger* is mostly black and with the apex of the wing completely hyaline (like such common species as *C. ater* Macquart, *C. carbonarius* Walker, *C. mitis* Osten Sacken, *C. cuclux* Whitney, and *C. cincticornis* Walker), *C. niger* and the closely related *C. calvus* Pechuman & Teskey should be readily separated by the characters given in the key. There are no other distinguishing features of much value.



Map 25. Collection localities of *Chrysops niger*.

Chrysops niger is a moderately common species through much of its eastern Canadian range but is rarely a troublesome biter. Larvae have been found in a wide variety of wetland situations, from sphagnum bogs and swampy organic soils to mostly mineral soils on the banks of small ponds, slow-flowing streams, and small rivers (Teskey 1969).

Distribution. Very similar to that of the preceding species but is more common in the Maritime Provinces (Map 25). In the United States it extends to Oklahoma and Florida. The flight period extends from 1 June to early August, but the species is particularly common from mid June to mid July.

Chrysops nigripes Zetterstedt

Figs. 119, 144; Map 26

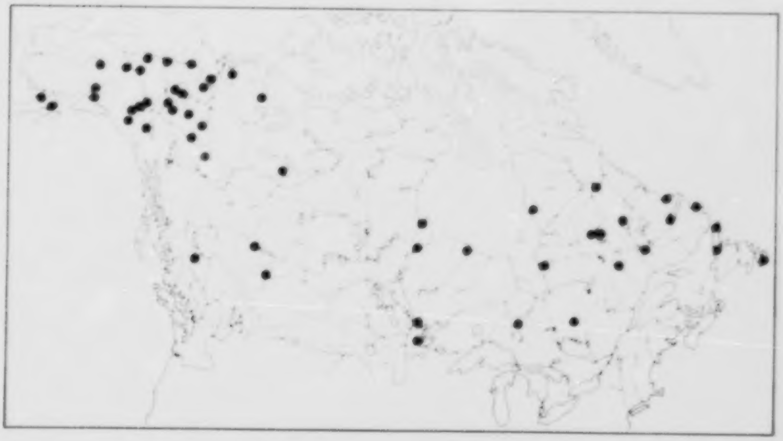
Chrysops nigripes Zetterstedt, 1838:579.

Female. Length 8–10 mm. Predominantly black. Frons slightly higher than basal width, widened below; frontal callus large, black; ocellar prominence irregularly glossy black, generally laterad of ocelli. Median occipital sclerite subglossy ventromedially. Antenna moderately slender, black. Clypeus and gena extensively glossy black; clypeus with median pruinose stripe to oral margin; gena with glossy areas nearly reaching eye margin. Palpus brown.

Thorax yellow-haired; submedian scutal stripes indistinct; lateral scutal and pleural stripes gray pruinose. Legs black. Halter dark brown. Wing (Fig. 119) with basal two-thirds and one-half of cells br and bm pigmented, respectively; crossband not reaching hind margin, extending through base of cell cua_1 into apex of cell *cup*; anterior margin with prominent spur projecting to fork of R_{4+5}; apical spot equal to or slightly wider than cell r_1 at junction with crossband, widening very little apically, to enter only tip of cell r_4.

Abdomen (Fig. 144) mostly black; tergite 1 and 2 laterally with small yellow patches; tergites 2–7 with narrow gray posterior margins, expanding into shallow median triangles on tergites 2–5. Sternum mostly black; sternites 1 or 2, or both, with yellow sublateral patches on posterior margin; remaining sternites with narrow gray margins.

Male. Similar to female except as follows: Darker, with more abundant black hair lacking and reduced gray pruinosity on thorax; abdominal tergites with less extensive lateral yellow patches, gray margins, and median triangles; clypeus with pruinose stripe complete to oral margin; wing with cells br and bm almost completely pigmented.



Map 26. Collection localities of *Chrysops nigripes*.

Remarks. This species is easy to identify based on its dark color and its wing pattern. *Chrysops zinzalus* Philip is the most closely related species.

Larvae have been found in saturated moss on the banks of pools in tundra meadows, which are common habitats throughout the range of the species (Teskey 1969).

Distribution. This species has a Holarctic distribution, from northern Scandinavia across the USSR into Alaska and northern Canada, where it is essentially restricted to the Hudsonian zone (Map 26). Reports of *C. nigripes* as far south as Maine and Idaho are apparently false. The Maine record was probably of *C. zinzalus*. Adults are active from late June to about mid August.

Chrysops noctifer Osten Sacken

Figs. 103, 142; Map 27

Chrysops noctifer Osten Sacken, 1877:220.
Chrysops pertinax Williston, 1887:132.
Chrysops nigriventris Bigot, 1892:604.

Female. Length 8–11 mm. Black. Frons slightly broader than high, extensively glossy black, including large subquadrate frontal callus, vertex to eye margin, and completely covering ocellar prominence and all of median occipital sclerite. Antenna black; basal half of scape and at least medially on base of pedicel reddish. Clypeus and gena extensively glossy black; clypeus with median pruinose stripe extending half its length.

Thorax not striped; scutum subglossy black, with mixed black and pale hairs; pleura grayish pruinose, with white hair. Legs black. Halter dark brown. Wing (Fig. 103) with pigmentation filling basal two-thirds of cells br and bm; crossband not quite reaching hind margin, but filling base of cell cua_1; apical spot paler than and separated from crossband, restricted to apices of cells r_1 and r_3.

Abdomen (Fig. 142) subshiny black dorsally and ventrally; tergite 1 or 2, or both, sometimes with yellowish spot of variable size laterally, the yellow rarely extending nearly to middle of tergite 2 and including much of sternites 1 and 2.

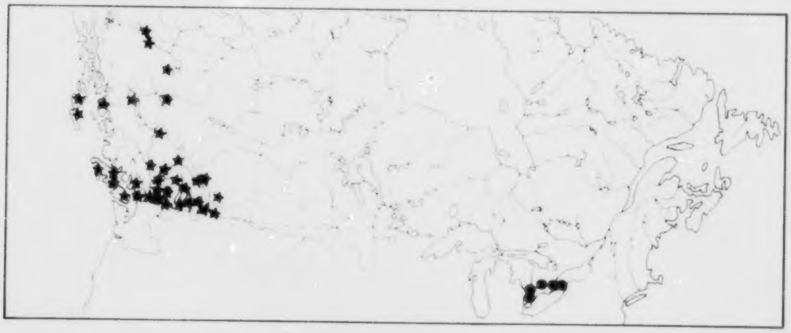
Male. Similar to female except as follows: Blacker; most abdominal hairs and all thoracic hairs black, except on laterotergite and metepimeron; apical wing spot often more extensive by narrowly entering anterior of cell r_4 over apical half of vein R_4.

Remarks. The name *C. noctifer* initially referred to the form's having pale sides on abdominal segments 1 and 2; the entirely black form was later named *C. pertinax*. Philip (1965) recognized the conspecificity of these two forms but preferred to consider the black form as a subspecies of *C. noctifer*. As there are gradations in the size of the pale abdominal side patches, some of them occurring over much of the range of the species, I prefer to follow Middlekauf and Lane (1980) in recognizing the name *C. pertinax* as a synonym of *C. noctifer*.

Chrysops noctifer is the only western deer fly having a dilute apical spot isolated from the wing crossband. Some specimens of the eastern species *C. sordidus* resemble *C. noctifer* but have a more dilute and restricted apical spot and the pigmentation in cell bm less extensive than in cell br. The larva is most similar to that of *Chrysops ater*.

Larvae were found in mineral soils bearing moderate organic matter on the margin of several beaver ponds and in a shallow, slow-flowing stream (Teskey 1985).

Distribution. This is a western montane species extending from southern Yukon Territory through British Columbia and western Alberta (Map 27) to California and Colorado. Adults have been collected between 30 April and 7 September, but most collections were made in July.



Map 27. Collection localities of *Chrysops noctifer* and *C. pikei*.

Chrysops pikei Whitney

Figs. 125, 161; Map 27

Chrysops pikei Whitney, 1904:205.

Female. Length 6–8 mm. Yellow and black. Frons about as wide as high, slightly widened below; frontal callus large, black; dorsal ocelli each in centre of small glossy black spot and similar spots to either side of ventral ocellus. Median occipital sclerite glossy black in ventral angle. Clypeus glossy yellow; gena with glossy areas above tentorial pits and on lower margin of head usually more or less brown. Palpus yellow. Antenna slender, yellow to reddish; terminal flagellomeres darker.

Thorax prominently yellowish pruinose and subglossy dark brown, striped in usual manner; scutellum brown, or sometimes with posterior margin yellow. Legs predominantly yellow; apex of fore tibia, fore tarsus, mid and hind coxae, and apical tarsomeres darker. Halter dark brown. Wing (Fig. 125) with cell br fully pigmented and cell bm nearly clear; crossband reaching hind margin in cell m_3 but not entering cell cua_1; vein CuA_2 with isolated pigmented patch bordering apex; apical spot only slightly wider than cell r_1 at junction with crossband but abruptly widened to cover most of cell r_4, apex of cell r_5, and anteroapical corner of cell m_1.

Abdomen (Fig. 161) quadristriate, with sublateral brown stripes narrower than submedian stripes and present only on tergites 3–5; sternites yellow, with sublateral narrow brown stripes beginning on sternites 2 or 3 and usually progressively larger median brown spots on sternites 3 or 4.

Male. Similar to female, differing only in basal third of cell bm being pigmented.

Remarks. The yellow and black striped abdomen, lack of clypeal pruinosity, fully infuscated cell br, and extensive hyaline triangle readily differentiate this species from other Canadian deer flies. The species is rarely collected and is of no economic importance in Canada. Larvae have been found on the margin of a slow-flowing stream (Teskey 1969).

Distribution. In Canada restricted to southern Ontario (Map 27), with an extensive distribution in the midwestern and southern United States, but absent in the northeastern United States and the Appalachian Highlands. Adults have been infrequently collected from mid June to August.

Chrysops proclivis Osten Sacken

Figs. 115, 150; Map 28

Chrysops proclivis Osten Sacken, 1877:222.
Chrysops atricornis Bigot, 1892:603.
Chrysops infurcatus Philip, 1936*a* (as var. *proclivis*).

Female. Length 7–10 mm. Yellow and black. Frons nearly as wide as high; frontal callus large, black; vertex with extensive black denuded area; frontal callus and vertex usually narrowly joined medially and separated laterally by narrow bands of gray pruinosity. Median occipital sclerite completely pruinose to over half-denuded, in latter case with mid dorsal pruinose patch. Antenna slender, dark brown; scape with yellowish median face. Clypeus usually entirely glossy yellow. Gena extensively glossy brown.

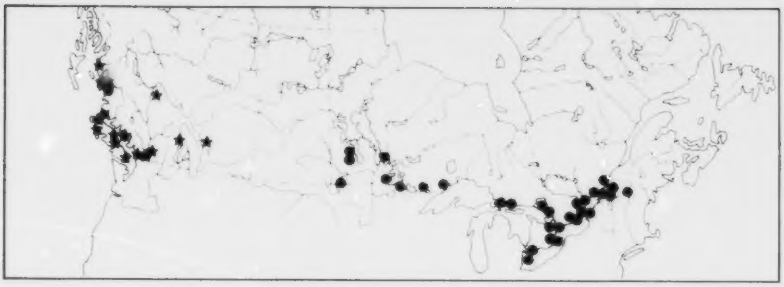
Thorax with scutum predominantly subglossy black; submedian paler stripes faintly indicated; lateral scutal and pleural pruinose stripes orange-haired, prominent. Legs black; base of fore tibia, apical half or more of mid and hind femur, all of mid and hind tibiae and basitarsi yellow. Halter black. Wing (Fig. 115) with cell br fully pigmented (or at least any clear area not crossing cell) and cell bm nearly clear; crossband narrowly or not quite reaching hind margin; apical spot narrowly or not connected to crossband, slightly widened distally and crossing apical one-quarter to one-half of vein R_4.

Abdomen (Fig. 150) with sides of first 2 tergites, posterior incisions in geminate and bigeminate black figures on tergites 2 and 3, and narrow posterior margins of tergites 4–7 orange; tergite 2 with sides often having isolated black spot. Sternites 1–4 yellow, with small sublateral and progressively larger median black spots; sternites 5–7 black, with narrow yellow posterior margins.

Male. Frontoclypeus, thorax, and abdomen similarly patterned to female. Differs from female as follows: Abdominal tergites 1 and 2 more broadly blackened laterally. Scape, pedicel, and ocellar tubercle with long black hair. Wing with apical spot crossing two-thirds of R_4; entire wing base pigmented, except contiguous clear spots in base of cell cua_1 and apex of cells bm and br.

Remarks. This species has a body color pattern almost identical to *C. furcatus*. However, the two can be readily distinguished by fore coxal color, the degree of pigmentation of cell bm, and the proximity of the crossband to the hind margin of the wing. Differentiating *C. proclivis* from *C. surdus* Osten Sacken is more difficult. Diagnostic features for this separation can be found under the latter species.

Immature stages are unknown. Larvae and pupae that Cameron (1926) described under this name were almost certainly of *C. furcatus* Walker.



Map 28. Collection localities of *Chrysops proclivis* (★) and *C. sackeni* (●).

Distribution. Confined to British Columbia in Canada (Map 28) and extending south to Colorado and California. The flight period extends from late May to mid August.

Chrysops pudicus Osten Sacken

Fig. 112

Chrysops pudicus Osten Sacken, 1875:381.

Female. Length 6–8 mm. Yellow and black. Frons higher than wide, nearly parallel-sided; frontal callus usually yellow, with upper and lateral margins brown but occasionally completely brown; ocelli flanked by small glossy brown spots. Median occipital sclerite pruinose. Antenna yellow, apical 4 flagellomeres black. Palpus yellow to pale brown.

Thorax with gray and dull black stripes in usual pattern. Legs with fore coxa, fore and mid femur, base of fore and hind tibia, all of mid tibia, and mid and hind basal tarsomeres yellow. Halter dark. Wing (Fig. 112) with only base of cell br and bm pigmented; crossband narrowly reaching hind margin in cell m_3 and not entering cell cua_1, although isolated pigmentation bordering vein CuA_2; apical spot as wide as cell r_1 at junction with crossband and only slightly widened distally to enter anteroapical corner of cell r_4.

Abdomen with tergites 1 and 2 mostly yellow; tergite 1 with narrow semicircular black mark below scutellum not attaining hind margin; tergite 2 with median inverted black V not attaining anterior or posterior margin; remaining tergites black, with narrow yellow posterior margin slightly expanding medially on tergites 3 and 4, forming pale triangles. Sternites 1 and 2 yellow; sternites 3 to 4 or 5 with median and often sublateral black spots; remaining sternites black, with narrow yellow posterior margins.

Male. Similar to female except as follows: Cells br and bm, with slightly greater extent of pigmentation, covering basal one-half to one-third and one-third to one-half of these cells, respectively; apical spot slightly wider, covering about half of R_4.

Remarks. Pechuman (1972) reported larvae found in wet soil along a roadside ditch. Goodwin (1976) described a pupa of this species.

Distribution. The species is known from two localities in Canada, Pleasant River, Queens County, N.S., and Chaffeys Locks, Ont. These, together with specimens in Michigan, Indiana, Wisconsin (Pechuman et al. 1983), and central New York (Pechuman 1981), are quite disjunct from the main range of the species, which is in the southern United States east of Louisiana and Arkansas and narrowly bordering the Atlantic Coast to Long Island. Collections from the Canadian locality were made from 23 June to 31 August.

Chrysops sackeni Hine

Figs. 110, 165; Map 28

Chrysops sackeni Hine, 1903:42.

Female. Length 8–11 mm. Yellow and black. Frons higher than basal width, slightly wider below; frontal callus usually predominantly yellow; dorsal and lateral margins dark brown but occasionally completely dark brown; ocelii bordered by dark glossy patches; median occipital sclerite with dark glossy ventral angle. Antenna slender, yellow; apical flagellomeres black. Clypeus and gena yellow, mostly glossy. Palpus yellow.

Thorax with subshiny dark brown to black and bluish gray pruinose stripes in usual pattern. Legs, except mid and hind coxa and apical tarsomeres, sometimes completely yellow, more often with variable amount of blackening on apex of fore tibia and base of hind femur. Halter dark brown. Wing (Fig. 110) with only bases of cells br and bm pigmented; crossband not reaching hind margin, narrowly entering base of cell cua_1 to diffusely unite with pigmentation bordering vein CuA_2; apical spot usually slightly wider than cell r_1 at junction with crossband and slightly widening distally to enter anteroapical corner of cell r_4.

Abdomen (Fig. 165) with lateral third of tergites 1 and 2 yellow; subquadrate black patch below scutellum meeting a geminate or inverted V-shaped black figure on tergite 2; remaining tergites predominantly black, with narrow yellow posterior margins; tergites 3 and 4 with lateral margins narrowly yellow and posterior yellow bands expanded into small median triangles. Sternites 1 and 2 yellow or with small median or sublateral black spots (or both), which are also present but progressively larger on sternites 3 and 4; sternites 5–7 black, with narrow pale posterior margins.

Male. Differs from female as follows: Clypeus with short pruinose spur below antenna; scutum almost uniformly black on disc; submedian paler stripes only faintly evident. Legs more extensively blackened. Wing with all but subapical spots in cells br and bm pigmented; apical spot slightly wider. Abdomen more extensively black, especially on tergites 1 and 2, reducing yellow to semicircular lateral quarters; median yellow triangles on tergites 2–4 usually much reduced in size.

Remarks. This species is most similar to *C. callidus*. The shape and color of the frontal callus (about half as high as wide and black in *C. callidus* and about two-thirds as high as wide and usually partly yellow or brown in *C. sackeni*) are useful subsidiary characters in determining specimens that are difficult to distinguish.

Some females have a wider than normal apical wing spot very similar to that of *C. dimmocki* Hine, of which a disjunct population exists in Ohio along the Lake Erie shore. That such specimens are variants of *C. sackeni* seems assured by the presence of sublateral black markings on sternites 2–4, a feature not present in *C. dimmocki*.

Chrysops sackeni does not often occur in sufficient numbers to be considered a pest in Canada. Larvae have been found on the margins of open and woodland pools and swamps, and among cattails bordering a stream, all very common larval habitats of Tabanidae (Teskey 1969). Eggs are deposited in a flat, single-tiered mass (Pechuman 1981).

Distribution. This species is more common in southern and southeastern Ontario, but has a narrow extension along the north shore of Lake Huron and a small population west of Lake Superior into southern Manitoba (Map. 28). Southern Manitoba was apparently colonized from Minnesota and Wisconsin, the western terminus of a range that extends east through northern Illinois, West Virginia, New Jersey, and southern Maine. Its flight period is from mid June to early August.

Chrysops shermani Hine

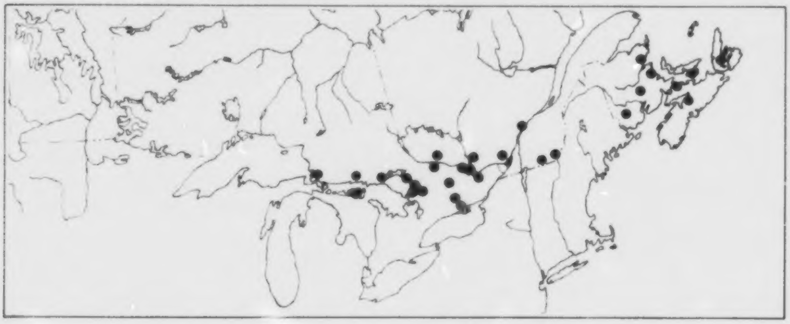
Figs. 123, 157; Map 29

Chrysops shermani Hine, 1907:229.

Female. Length 7–10 mm. Yellow and black. Frons slightly higher than basal width, widened below; frontal callus large, yellow, with upper margin narrowly dark brown; ocellar prominence completely subglossy black, connected to similar black median stripe running length of median occipital sclerite. Antenna black; scape yellow; basal flagellomere dull reddish. Clypeus and gena dominantly glossy yellow. Palpus yellow.

Thorax prominently striped in usual manner. Legs extensively yellow; mid and hind coxae, apical half of fore tibia, fore tarsus, and base of hind femur black. Halter dark. Wing pigmentation pattern fractured by hyaline zones bordering veins (Fig. 123).

Abdomen (Fig. 157) with tergites 2–4 having 4 more or less discrete longitudinal black stripes; submedian stripes united on tergite 2 and continuing as a solid figure across median third of tergite 1; tergites 5–7 black, with yellowish posterior borders. Sternites 1–5 yellow, with median and sublateral black spots of variable size; sternites 6 and 7 mostly black.



Map 29. Collection localities of *Chrysops shermani*.

Male. Differs from female only in sexual characters.

Remarks. This species is quite easy to identify. The fenestrate wing pattern, the more or less well-developed quadristriate abdominal pattern, and the mostly yellow frontal callus are, in combination, quite distinctive characters. Larvae were found in a nonvegetated sand bar in a small Vermont river (Teskey 1969).

Distribution. This species has a generally southern Canadian transition zone distribution (Merriam 1892) from Wisconsin through the northern half of Michigan to southeastern Ontario, southern Quebec, and the Maritime Provinces (Map 29), south along the Appalachians to North Carolina. The flight period is from the latter part of June to mid August.

Chrysops sordidus Osten Sacken

Figs. 102, 145; Map 30

Chrysops sordidus Osten Sacken, 1875:376.

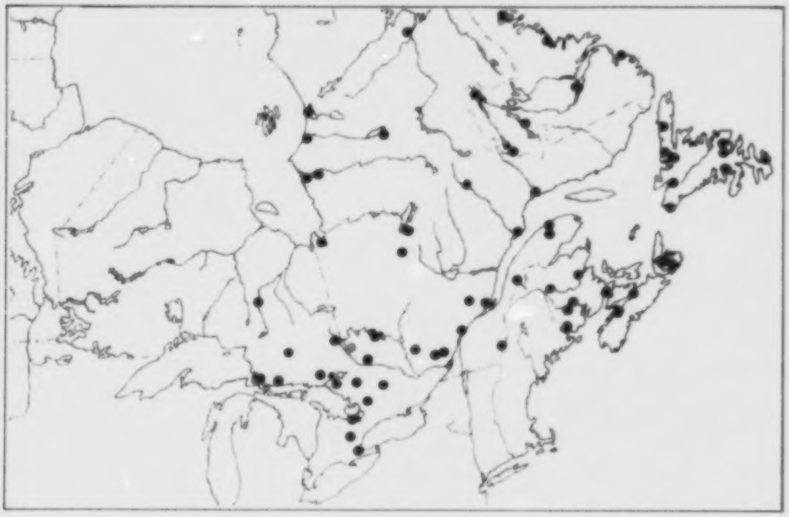
Female. Length 8–10 mm. Black. Frons as wide as high, slightly wider below; frontal callus black; ocellar prominence subglossy black. Median occipital sclerite glossy black medially. Antenna black; scape reddish orange. Clypeus and gena with denuded areas glossy black; clypeus with median pruinosity extending over half its length. Palpus black.

Thorax faintly dark brown and gray striped on scutum; hairs yellowish orange; notopleural lobe usually with some black hairs. Legs and halter black. Wing (Fig. 102) with cells br and bm about two-thirds and one-quarter pigmented, respectively; crossband not reaching hind margin; apical spot faintly bordering costa to wing apex.

Abdomen (Fig. 145) black; tergites 1 and 2 with yellow patches laterally; tergites 2–7 with narrow gray posterior borders, the borders expanding into small median gray triangles on tergites 2–5.

Male. Similar to female except as follows: Antennal scape swollen. Head and thorax with more of hairs black, including all thoracic pleural hairs. Wing with cells br and bm pigmented; small subapical spots clear.

Remarks. Females of this species appear in two places in the key because the apical wing spot is on the borderline between being vague and present and being merely narrow. The abdominal color pattern is similar to that of *C. nigripes* Zetterstedt and *C. zinzalus* Philip, and the wing pigmentation is sometimes difficult to distinguish from that of *C. ater* Macqart.



Map 30. Collection localities of *Chrysops sordidus*.

Chrysops sordidus is a moderately common species in northern Quebec, where it can be a troublesome pest to humans and to wild and domesticated animals.

Distribution. The species has a northeastern distribution centred in Quebec (Map. 30) but including eastern Ontario, Labrador, Newfoundland, and the Maritime Provinces and extending into the northern parts of the New England States and New York. The species has been collected as early as 7 June but is most abundant in the latter part of June and most of July.

Chrysops striatus Osten Sacken

Figs. 121, 156; Map 31

Chrysops striatus Osten Sacken, 1875:391.

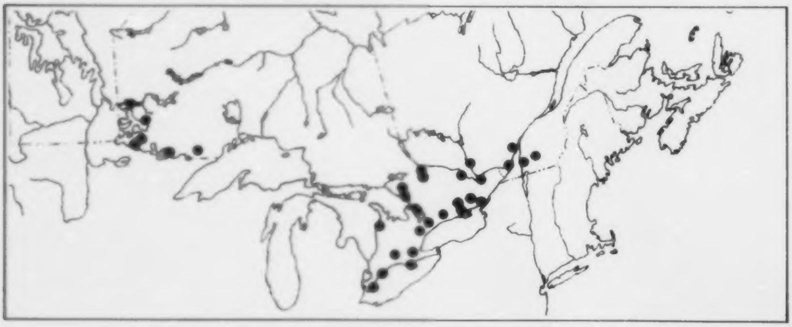
Female. Length 7–10 mm. Yellow and black. Frons higher than basal width, widest below; frontal callus and ocellar prominence black. Median occipital sclerite usually with small ventral glossy spot. Antenna yellow, apical 4 flagellomeres black. Clypeus and gena predominently glossy yellow, but usually somewhat darkened above tentorial pits and ventrolateral margin of subgena. Palpus yellow.

Thorax with normal longitudinal stripes; stripes less conspicuous on scutum than on pleura; scutellum often with reddish hind margin. Legs predominantly yellow; mid and hind coxae, base of hind femur, apex of front tibia, front tarsus, and apical tarsomeres of other legs black. Halter dark brown. Wing (Fig. 121) with cell br fully pigmented; crossband reaching hind margin in cell m_3 and not entering cell cua_1; apical spot broader than cell r_1 at junction with crossband and filling half or more of cell r_4.

Abdomen dorsally (Fig. 156) quadristriate, with submedian black stripes usually joined anteriorly on tergite 2; tergite 2 with sublateral stripes often indistinct or absent. Sternites 1 to 4 or 5 yellow, with progressively larger median and sublateral black spots; sternites 5 or 6 to 7 black, with narrow yellow posterior margins.

Male. Similar to female except with cell bm almost fully pigmented and abdominal black stripes slightly wider and more prominent.

Remarks. Records of this species before the description of *C. aberrans* by Philip (1941) should be used with caution because of the similarity of the two species. One distinguishing feature of females of the two species that is not given in the key and other remarks relative to both species are given under *C. aberrans*.



Map 31. Collection localities of *Chrysops striatus*.

Larvae of this species have been collected only once, in a thick layer of silt on the margin of a small river in a partly forested, marginal agricultural area of eastern Ontario (Teskey 1969). Pechuman (1981) points out the possible occurrence of *C. striatus* larvae in cattail marshes coinciding with the common occurrence of adults in such habitats.

Distribution. *Chrysops striatus* is present in states and provinces bordering the Great Lakes (except north of Lakes Superior and Huron), has a small foothold in southern Quebec (Map 31), and extends to the Atlantic Coast via the New England States. Collection records of adults extend from 24 June to 25 August.

Chrysops surdus Osten Sacken

Fig. 104

Chrysops surda Osten Sacken, 1877:223.
Chrysops proclivis var. *piceus*, Philip 1936*a*:157.
Chrysops surdus var. *piceus*, Philip 1965:327.

Female. Length 6.5–8 mm. Yellowish orange and black. Frons as wide as high; large basal callus and equal area at vertex surrounding ocelli; ocelli glossy black, narrowly joined medially to basal callus and with sublateral oblique projections toward outer edge of basal callus. Median occipital sclerite mostly glossy black, with only lateral borders narrowly pruinose. Antenna slender; scape, pedicel, and base of flagellum orange; remainder of antenna black. Clypeus with glossy black spot above tentorial pit, the spot extending well onto clypeus and sometimes ventrally toward oral margin; remainder of clypeus yellowish orange.

Thorax black, yellow-haired; scutum with grayish pruinose longitudinal stripes submedially and sublaterally; pleura with grayish pruinose longitudinal stripes mid laterally and dorsally; dorsal pleural and sublateral scutal stripes with long more dense yellow hair. Fore legs black to dark brown; mid and hind tibiae and apices of femora dull yellowish brown. Wing pigmentation pattern (Fig. 104) most similar to *C. proclivis* (Fig. 115); apical spot usually crossing no more than apical quarter of vein R_4.

First 2 abdominal tergites broadly yellowish orange laterally, with median black longitudinal stripe; tergite 2 with small median posterior yellow triangle and lateral black spot; remaining tergites black, with yellow posterior borders; tergites 3 and 4 with median and often sublateral yellow indentations that medially often cross tergites. Sternites 1 to 3 or 4 orange, with progressively larger median and sublateral black patches; remaining sternites black, with narrow yellow posterior margins.

Male. Similar to female except as follows: Darker. Tergites 1 and 2 mainly black; tergite 2 with sublateral narrow yellow lines. Wing similar to male of *C. proclivis*, with cell bm equally pigmented to cell br; entire anal area mainly dilutely pigmented; cell cua_1 with clear basal spot contiguous with similar clear spots in cells br and bm.

Remarks. This species is similar to *C. proclivis*, as indicated by its past subspecies status under *C. proclivis*. In addition to the diagnostic characters used in the key, this species differs from *C. proclivis* in its smaller size and more extensive median yellow markings on the abdominal tergites and its narrower apical wing spot.

Lane (1975) described larvae and pupae of *C. surdus*. The species seems to prefer mountainous terrain.

Distribution. Philip (1947) records this species (as *C. proclivis* ssp. *surda* Osten Sacken) in British Columbia, and L.L. Pechuman has a confirmed collection record from Cameron Lake, Vancouver Island, dated 21 July 1935. I have seen a specimen from the coastal Swindle Island (52.5°N). The species ranges south to Washington and Oregon, California, and western Nevada.

Chrysops univittatus Macquart

Figs. 124, 163; Map 32

Chrysops univittatus Macquart, 1855:56.
Chrysops wiedemanni Krober, 1926:267.
Chrysops fraternus Krober, 1926:317.

Female. Length 5–8 mm. Black with yellow median stripe on abdomen. Frons slightly higher than basal width, slightly wider below; frontal callus large, brown to black; ocellar prominence covered by dark subquadrate glossy area separated by band of pruinosity from glossy patch ventrally on median occipital sclerite. Clypeus and gena predominantly shiny yellow, tentorial pits with brown patch above. Palpus brown. Antenna slender; scape and pedicel yellow; flagellum black.

Thorax striped, but paler stripes on scutum bluish gray and contrasting much less with dark brown lateral stripes than with yellow and brown stripes on pleura. Legs predominantly yellow; mid and hind coxae, bases of mid and hind femora, apex of fore tibia, fore tarsus, and apical tarsomeres of other legs black. Halter dark brown. Wing (Fig. 124) with cells br and bm clear; crossband not or only narrowly reaching hind margin and not reaching vein CuA_1; apical spot almost separated from crossband basally but expanded distally to cross apical half of vein R_4.

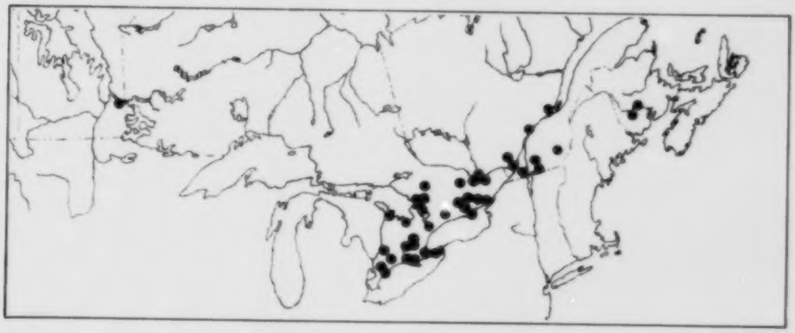
Abdomen dorsally (Fig. 163) dark brown to black, with median yellow stripe extending to tergite 4; first 2 or 3 tergites with lateral margins yellow and sometimes appearing as an incipient sublateral yellow stripe. Sternites 1–3 yellow, with sublateral and progressively expanding median black stripe; sternites 4–7 black.

Male. Similar to female and differing consistently only in cell br being fully pigmented.

Remarks. The name of this species denotes its most conspicuous feature. Only one other species in the Canadian fauna, *C. macquarti* Philip, could be confused on this basis. However, features of the wing readily separate the two. Before 1961 these two species were the subject of some confusion. This problem is explained in the discussion under *C. macquarti*.

Chrysops univittatus is a common species in southern and eastern Ontario and sometimes may be a severe pest, particularly in open woodland areas. It attacks with little warning.

Larvae of *C. univittatus* were among the most commonly collected by Teskey (1969), and most were found in wet soil on the margins of slow-flowing streams.



Map 32. Collection localities of *Chrysops univittatus*.

Distribution. The Canadian distribution of *C. univittatus* (Map 32) is only a small part of a range covering most of the United States east of the states bordering on the Mississippi River, except for the peninsular part of Florida. Adult collection dates range from mid June to the end of August.

Chrysops venus Philip

Fig. 127; Map 33

Chrysops venus Philip, 1950*a*:457.

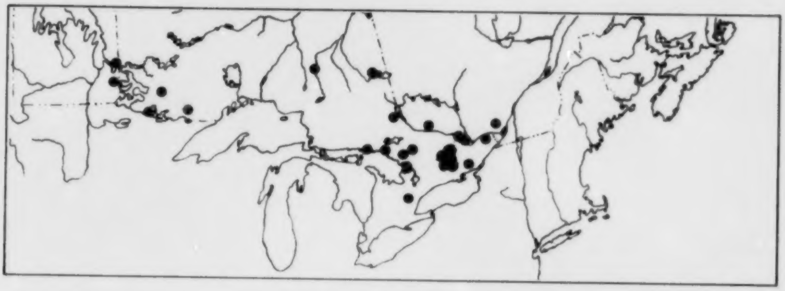
Female. Length 8–11 mm. Yellow and black. Frons slightly higher than basal width, slightly widened below, with large frontal callus; extensive area at vertex, including ocellar prominence and all of median occipital sclerite, glossy black. Antenna with scape slightly swollen; scape and, to a lesser extent, pedicel and base of flagellum orange; remainder of antenna black. Clypeus and genae black, with extensive covering of yellowish pruinosity, including a rather broad median band on clypeus below antennae. Palpus yellowish orange.

Thorax with prominent lateral scutal and pleural stripes; stripes gray, pruinose, bearing dense yellow hairs; disc of scutum and scutellum black. Legs black; base of fore and mid tibia and mid and hind basitarsi yellow. Halter black. Wing (Fig. 127) with basal half and third of cells br and bm pigmented; crossband reaching hind margin, filling cells m_3, cua_1, and apex of cell cu*p*; apical spot almost reaching fork of R_{4+5} basally and filling one-half to two-thirds of R_4.

Abdomen with tergites 1 and 2 mostly yellow; tergite 1 with semicircular black band below scutellum, the band narrowly meeting small median black triangle on anterior of tergite 2; tergites 3–7 black, with yellow posterior bands. Sternites 1 and 2 dominantly yellow; sternites 3–7 with progressively more extensive anterior black bands.

Male. Similar to female but pigmentation of cells br and bm more extensive.

Remarks. Before *C. venus* was described it was confused with *C. frigidus* Osten Sacken, from which it is now readily distinguished by its larger size, more immaculate appearance (resulting largely from the distinct yellow pleural hair and the prominently banded abdomen with the black bands never strongly indented by yellow), and predominantly black hind legs. There is greater similarity, in size and abdominal color pattern, between *C. venus* Philip and *C. asbestos* Philip, but leg coloration and wing pigmentation pattern provide adequate means of distinction.



Map 33. Collection localities of *Chrysops venus*.

Larvae have been collected in saturated moss around partly shaded forest pools (Teskey 1969).

Distribution. Southeastern Manitoba to southern Quebec (Map 33), south to New York, Michigan, and Wisconsin. Collection records of adults extend from 2 June to 2 September, but most are in July.

Chrysops vittatus Wiedemann

Figs. 131, 158; Map 34

Chrysops vittatus Wiedemann, 1821:56.
Chrysops areolatus Walker, 1848:197.
Chrysops lineatus Jaennicke, 1867:334.
Chrysops ornatus Krober, 1926:328.

Female. Length 7–10 mm. Yellow and dark brown. Frons slightly higher than basal width, widened below; frontal callus yellow, usually with darker dorsal margin; margin of each ocellus and ventral angle of median occipital sclerite with dark glossy spots. Antenna slender; scape, pedicel, and more or less of basal enlargement of flagellum yellow; apical flagellomeres black. Clypeus and gena predominantly glossy yellow. Palpus yellow.

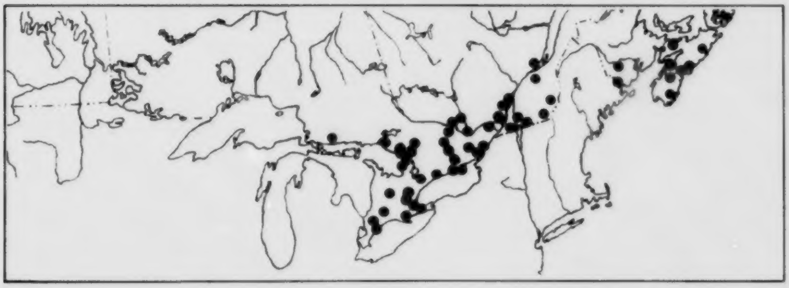
Thorax with prominent alternating yellow pruinose and dark brown glossy stripes dorsally and laterally. Scutellum yellow. Legs predominantly yellow; mid and hind coxae and portions of tarsi dark brown. Wing (Fig. 131) with cell br nearly fully pigmented and cell bm one-third pigmented; crossband reaching hind margin and dilutely filling cell cua_1; basal lunule clear; apical spot broad and nearly filling cell r_4, the hyaline triangle just encompassing fork of R_{4+5}.

Abdomen (Fig. 158) yellow, with 4 narrow dark brown longitudinal stripes dorsally. Sternites with median stripe or sublateral brown stripes, or both.

Male. Similar to female, differing only in pigmentation filling basal half of cell bm.

Remarks. This species is distinctive and readily distinguished by the characters given in the key. It is among the most abundant of *Chrysops* species in southern and eastern Ontario and a very troublesome pest of humans and other animals.

Larvae have been found in almost all types of wetland situations, except sphagnum bogs and other places with abundant, poorly decayed vegetation (Teskey 1969).



Map 34. Collection localities of *Chrysops vittatus*.

Distribution. This species has been collected in southern Ontario, southern Quebec, Nova Scotia, New Brunswick (Map 34), and the eastern half of the United States. Its flight period extends from mid June to late August, with the greatest abundance occurring in July.

Chrysops zinzalus Philip

Figs. 120, 143; Map 35

Chrysops zinzalus Philip, 1942:62.
Chrysops lapponica Brennan, 1935:378 (not Loew).

Female. Length 7–9 mm. Predominantly black. Frons higher than wide, widened below; large frontal callus connected to equally large glossy black area at vertex, the latter encompassing ocellar prominence and extending medially onto median occipital sclerite. Antenna black. Glossy areas of clypeus and gena black; clypeus with narrow median pruinose band below antennae. Palpus black.

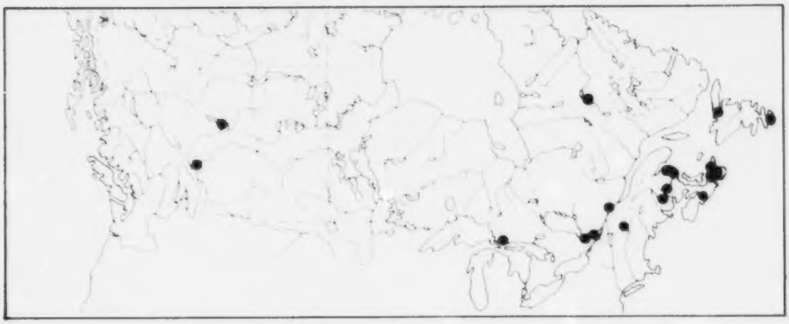
Thorax with weakly differentiated bluish gray scutal stripes and more prominent pleural striping; thorax dominantly yellow-haired, except for sparser black hairs on notopleura. Legs and halter black. Wing (Fig. 120) with base of cells br and bm about one-half and one-quarter pigmented, respectively; crossband not reaching hind margin and extending across base of cell cua_1 into apex of cell *cup*; apical spot slightly wider than cell r_1 at junction with crossband and slightly expanded distally to cross one-half to two-thirds of vein R_4 to occupy only anteroapical corner of cell r_4.

Abdomen (Fig. 143) predominantly black, tergites 1 and 2 with sides and all tergites with hind margins very narrowly yellow and expanding into small median yellow triangles on tergites 2 to 4 or 5. Sternites black; hind margins grayish.

Male. Similar to female, differing only in pigmentation covering basal two-thirds of both cells br and bm.

Remarks. This species was confused with *C. nigripes* Zetterstedt until Philip (1942) distinguished it, based on rather few specimens and potentially variable characters. However, the acquisition of further specimens, all sharing the same differences, provides confirmation of its specific status.

Distribution. This species occurs primarily in eastern Canada (Map 35), the adjacent New England States, and New York. Thomas (1978) discovered the apparently disjunct population in Alberta. The rather few Canadian collections have been made from mid June to late August.



Map 35. Collection localities of *Chrysops zinzalus*.

Subfamily Tabaninae

Moderate to large-sized flies characterized by the lack of ocelli or by only rudimentary ocelli and by apical spurs on the hind tibiae; antennal flagellum comprised of a basal plate, showing no evidence of its ancestral derivation from 4 flagellomeres and 4 (rarely three) apical flagellomeres; gonostylus of male genitalia truncate; caudal ends of the spermathecal ducts of the female with mushroom-like expansions.

Genus *Haematopota* Meigen

Moderate-sized, slender, gray to black, with head distinctly wider than high and wider than thorax. Frons nearly as wide as or slightly wider than high. Eye lightly haired, with variable but usually intricate pattern in life. Antenna with scape more than 1.5 times as long as wide, often swollen; first flagellomere longer and wider than apical 3 or 4 flagellomeres and bilaterally symmetrical. Wing with intricate pattern of gray or brown pigmentation (Figs. 137–139). Legs often banded black and white or black and yellow.

Key to species of *Haematopota*

Females

1. Color dominantly brown. Antennal scape with subapical dorsal notch .... ***champlaini* Philip** (p. 139)

   Color dominantly black. Scape without subapical dorsal notch 2

2. Halter knob yellow. Basal callus with dorsal margin indented medially. Second palpal segment about 2.5 times as long as its greatest diameter .... ***americana* Osten Sacken** (p. 137)

   Halter knob black. Basal callus with dorsal margin extended into shallow point medially. Second palpal segment about 3.5 times as long as its greatest diameter .... ***rara* Johnson** (p. 139)

Males (*champlaini* not known)

1. Scape and median postocular fringe with prominent long white hairs. Eye brown-haired .... ***americana* Osten Sacken** (p. 137)

   Scape and postocular fringe with relatively sparser black hair. Eye white-haired .... ***rara* Johnson** (p. 139)

Tableau d'identification des espèces du genre *Haematopota*

Femelles

1. Livrée dominée par le brun. Scape portant une encoche dorsale subapicale .... ***champlaini* Philip** (p. 139)

   Livrée dominée par le noir. Scape sans encoche dorsale subapicale 2

2. Balancier jaune. Bordure dorsale du calus inférieur échancré en position médiane. Deuxième article du palpe environ 2,5 fois plus long que large à son diamètre maximal .... ***americana* Osten Sacken** (p. 137)

   Balancier noir. Bordure dorsale du calus inférieur se prolongeant en un point médian peu épais. Deuxième article du palpe environ 3,5 fois plus long que large à son diamètre maximal .... ***rara* Johnson** (p. 139)

Mâles (celui de *H. champlaini* inconnu)

1. Scape et frange postoculaire médiane portant de longs poils blancs visibles. Oeil à pilosité brune .... ***americana*** **Osten Sacken** (p. 137)

Scape et frange postoculaire médiane portant de longs poils noirs plus clairsemés. Oeil à pilosité blanche .... ***rara*** **Johnson** (p. 139)

Haematopota americana Osten Sacken

Fig. 137; Map 36

Haematopota americana Osten Sacken, 1875:395.

Female. Length 9–11 mm. Frons wider than high, narrowed above, gray; vertex suffused with brown to either side of slender median pale line; basal callus denuded, with black velvety round to oval patches laterally above and with small median dark spot more dorsally; basal callus five to six times wider than median height, indented medially. Subcallus with velvety brown patch medially. Antenna dark brown to black; scape evenly swollen, about 1.5 times as long as greatest diameter, pruinose on basal half, denuded and shiny distally; pedicel very small; basal flagellomere about two-thirds width of scape and twice as long as own width; apical 3 flagellomeres slightly longer than width of basal flagellomere. Gena whitish pruinose, with peppering of brown spots. Second palpomere creamy white, with white hair basally mixed with black hair distally, swollen basally, tapered distally. Eye sparsely short, white-haired.

Thoracic scutum brownish black; lateral margin, including notopleura and narrow median and sublateral stripes, gray. Pleura, coxae, and femora gray pruinose, mainly white-haired; tibiae and tarsi mainly dark brown to black; bands of yellow basally on fore tibia, basally and medially on mid and hind tibiae, and basally on hind basal tarsomere. Halter yellow. Wing pattern relatively pale (Fig. 137).

Abdomen dark brown to black; tergites with hind margins narrowly gray, sometimes slightly widened medially; several or all of tergites 2–7 with round sublateral median gray spots. Sternites uniformly gray.

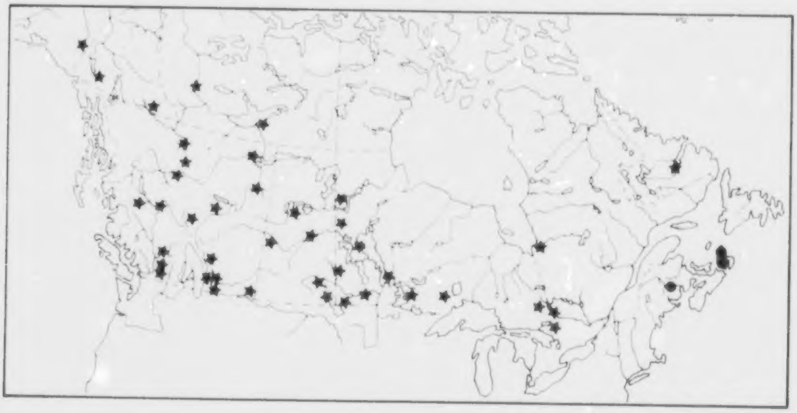
Male. Similar to female except knob of halter darkened. Antenna with hairs on scape as long as its diameter and mainly white. Eye with long dense brown hairs. Second palpomere about twice as long as its diameter, mostly black-haired.

Remarks. With the distinctive pigmentation pattern on the wing and prominent antennal and frontal characteristics that readily distinguish the genus, and with only three species in Canada having rather different distributions, their identification presents no difficulty.

Larvae of *H. americana* have been found in wet mineral soils on the margins of drainage ditches, small freshwater lakes, prairie sloughs, alder swamps, and small slow-flowing streams (Cameron 1928; Teskey 1984). Cameron gives evidence of a possible 2-year life cycle for the species.

Females are sometimes troublesome biters of humans and livestock on the prairies.

Distribution. This species has been found in Alaska, British Columbia, all the Prairie Provinces, northern Quebec, Labrador (Map 36), south to Idaho and states bordering the Rocky Mountains, Colorado, and California. The flight period extends from mid June to mid August.



Map 36. Collection localities of *Haematopota americana* (★) and *H. rara* (●).

Haematopota champlaini (Philip)

Fig. 139

Chrysozona champlaini Philip, 1953:248.

Female. Length 9–10 mm. Grayish brown, dominantly white-haired. Frons slightly narrowed above, mainly gray pruinose; transverse basal callus glossy brown; subcallus with velvety black patches above lateral margins of basal callus; median spot much smaller and more dorsal than basal callus; subcallus with upper margin projecting in a shallow point. Antenna pruinose basally, glossy apically; scape brown, swollen, with subapical dorsal notch; basal flagellomere yellow basally; remainder of flagellum darkened. Second palpomere yellowish, with black and pale hair.

Thorax gray pruinose over brown integument; scutum more sparsely pruinose, with median and sublateral narrow paler stripes. Legs with yellow bands basally on all tibiae, on mid and hind basitarsi, and subapically on mid and hind tibiae. Wing pattern relatively pale (Fig. 139).

Abdomen brown; posterior margins of segments, sublateral patches on tergites 2–6, and very faint median stripe paler.

Male. Not known.

Remarks. This species has been rarely collected. It is readily differentiated from the other two species of the genus found in Canada by the body coloration and antennal features.

Distribution. In Canada it is known only in Black Sturgeon Lake near the northern border of Lake Superior. The only other collections are from Rhode Island and west-central Pennsylvania (Burger and Pechuman 1986).

Haematopota rara Johnson

Fig. 138; Map 36

Haematopota rara Johnson, 1912:182.

Female. Length 7–9 mm. Head with frons slightly wider than high, narrowed above, predominantly grayish brown pruinose; denuded basal callus with velvety black patches laterally above and small black spot medially; patches and spot surrounded by slightly more yellowish to whitish pruinosity, which also forms slender line from median spot over vertex. Basal callus shiny brown to black, about five times as wide as median height, with upper border emarginate sublaterally. Subcallus velvety black medially. Antenna with scape strongly swollen, reddish brown to black, pruinose basally, shiny elsewhere, black-haired; basal flagellomere yellow orange to black; terminal 3 flagellomeres dark brown to black. Clypeus and gena white pruinose; gena with peppering of brown spots. Second palpomere creamy white, with black and white hair. Eye with minute hairs.

Thorax brown dorsally, with median and sublateral grayish stripes. Pleura and coxae grayish pruinose; remainder of legs mainly dark brown; yellow banding on tibiae and hind basal tarsomere, fore tibia with basal band, and mid and hind tibiae with subbasal and subapical bands. Halter stem yellow; knob dark brown. Wing pigmentation pattern rather dark (Fig. 138).

Abdomen dark brown dorsally; tergites with hind margins narrowly gray; tergites 3–5 with small, often indistinct, sublateral gray spots. Sternites more uniformly gray, with caudal margins very narrowly paler.

Male. Similar to female except as follows: Dorsal body coloration blacker, banding pale, and spotting of abdomen obsolete; hair coloring very similar to female except for eye with moderately longer white hair.

Remarks. This species has been rarely collected, but recent efforts by Dr. G.B. Fairchild and staff of the Biosystematics Research Centre have turned up enough specimens in Cape Breton, N.S., to suggest that the species may be more seclusive than rare. In Cape Breton and elsewhere in its range the species has been collected most often in fens, which may indicate this to be the larval habitat.

Distribution. The Cape Breton collections and another in Sunbury County, N.B., are the only ones known in Canada (Map 36). In the United States there are several apparently disjunct populations in New Hampshire, New York, Pennsylvania, Ohio, West Virginia, and Tennessee. The Canadian collections were made from 11 July to 14 August.

Genus *Hybomitra* Enderlein

Length 10–20 mm. Rarely completely black but usually integument and hairs of varied color pattern; abdomen especially with varied color pattern; tergites with varied color pattern often involving a partial median black stripe; tergites with orange to brown sidemarkings and posterior fringes and with median and sublateral patches of paler hairs but never with an uninterrupted median pale stripe. Eyes usually pubescent; hairs longer in males. Ocellar tubercle present in female, involving a partly glossy elevation that often shows a faint indication of one or more vestigial ocelli; in males ocellar tubercle usually glossy anteriorly. Frons with glossy basal and median callus; basal callus subquadrate, as wide or nearly as wide as frons; median callus usually linear. Eye color pattern in females usually involving 3 or 4 transverse stripes in the form of either 3 dark stripes on a green background or 4 greenish stripes on a dark background; in males eye color pattern involving 2 or 3 paler stripes on lower one-third to one-half of eye. Upper ommatidia of males often enlarged but not to same extent as some *Tabanus*.

Key to species of *Hybomitra*

Females

1. Black species with first 3 abdominal tergites mostly bright orange and remaining tergites totally black (Fig. 196) 2

   Abdominal tergites not solidly colored but with varied color pattern or, if first 3 tergites predominantly orange, this color also present laterally on tergite 4 3

2. Subcallus pruinose; palpus orange; face and pleura usually with some yellow hairs. Wing lightly pigmented (Manitoba to Quebec) .... ***criddlei* (Brooks)** (p. 190)

   Subcallus partly bare and shiny (Fig. 22*d*); palpus black; face and pleura with black hairs. Wing rather heavily pigmented (southern Ontario and Quebec) ...... ***cincta* (Fabricius)** (p. 188)

3. Abdomen without median or sublateral stripes or rows of pale markings; all tergites with posterior margins having narrow yellowish bands (Figs. 187). Hind tibia with posterior fringe of hairs yellow 4

   Abdomen otherwise marked or, if tergites with dominant very narrow pale margins, hind tibia with posterior fringe of hairs black 5

4. Abdomen almost completely yellow-haired. Apical one-third to one-half of hind femur yellow. Notopleural lobe black. Subcallus partly denuded (Fig. 12*d*) (northern Quebec) .... ***aequetincta* (Becker)** (p. 172)

   Abdomen with yellow hair confined to pale pruinose posterior margins of tergites and with black hair on remaining anterior black integument. Hind femur with only extreme apex yellowish. Notopleural lobe reddish. Subcallus pruinose (Fig. 56*d*) (transcontinental) .... ***zonalis* (Kirby)** (p. 248)

5. Entirely black, including palpus, antenna, and all hairs except on occiput and anterior part of scutum. Subcallus and gena glossy black (Fig. 47) (southern British Columbia) .... **procyon** (**Osten Sacken**) (p. 233)

Palpus and usually parts of antenna and abdomen paler, with many pale hairs on pleura and head. Subcallus and gena grey pruinose, except in *H. longiglossa* (Philip) 6

6. Antenna, thorax (including legs), and abdomen dominantly black (British Columbia and Alberta) .... **lanifera** (**McDunnough**) (p. 208)

Part of antenna or tibia reddish; abdomen with at least moderately paler tergal margins; one or more tergites with median pale spots or lateral reddening 7

7. Abdomen predominantly black; tergites 2 or 3 (or both) with sides diffusely reddish but lacking distinct sublateral and median paler white-haired spots; all tergites with posterior margins very narrowly pale (Fig. 170). Palpus slender 8

Abdomen with median or sublateral (or both) pale spots or sides of tergites distinctly reddish. Palpus slender to stout 9

8. Subcallus and median patch on clypeus denuded and glossy. Notopleural lobe reddish (eastern) .... **longiglossa** (**Philip**) (p. 213)

Subcallus and clypeus pruinose. Notopleural lobe black (Alaska to Northwest Territories) .... **sexfasciata** (**Hine**) (p. 238)

9. Subcallus denuded and glossy 10

Subcallus pruinose 22

10. Subcallus swollen. Most of genae and clypeus denuded and glossy. Small species with dark wing markings (eastern Ontario) .... **hinei** (**Johns**) (p. 202)

Subcallus normal. Genae and clypeus wholly pruinose and not shining 11

11. Abdomen broadly orange brown laterally, with median black area narrowest on third tergite (Fig. 181) 12

Abdomen either not broadly orange brown laterally or with median dark area on third tergite as broad as that on second tergite 14

12. Wing membrane bordering all crossveins and fork of R_{4+5} spotted with dark pigmentation (widespread) .... **lasiophthalma** (**Macquart**) (p. 209)

Wing membrane bordering crossveins and fork of R_{4+5} clear 13

13. Basal callus flat and wrinkled. Second palpomere rather swollen, about 2.5 times as long as greatest diameter. Frons no more than 0.6–0.9 mm wide at base and at level of ocellar tubercles, respectively (Fig. 41) (transcontinental) .... ***nitidifrons*** ssp. ***nuda*** **(McDunnough)** (p. 222)

    Basal callus evenly rounded. Second palpomere at least three times as long as greatest diameter. Frons at least 0.7–1.0 mm wide at base and at level of ocellar tubercle, respectively (Fig. 21) (British Columbia) .... ***captonis*** **(Marten)** (p. 186)

14. Femora partly or wholly yellow brown in ground color 15

    Femora uniformly black in ground color 16

15. Costal cell and fork of R_{4+5} lightly pigmented; fork of R_{4+5} without a spur vein. Abdominal tergites orange sublaterally (southern British Columbia) .... ***aasa*** **(Philip)** (p. 170)

    Costal cell and base of R_{4+5} clear; R_{4+5} usually with a short spur vein. Abdominal tergites without orange coloration (transcontinental) .... ***liorhina*** **(Philip)** (p. 211)

16. Notopleural lobe black; basal callus convex and smooth 17

    Notopleural lobe usually yellowish brown; if black, basal callus flat and moderately wrinkled 20

17. Second abdominal tergite laterally entirely orange in ground color 18

    Second abdominal tergite no more than partly orange laterally but usually entirely black 19

18. Scape and pedicel orange. Subcallus completely denuded of pruinosity, glossy brown to black medially, and usually haired laterally (Fig. 49) (British Columbia and Alberta) .... ***rupestris*** **(McDunnough)** (p. 236)

    Scape and pedicel black. Subcallus only partly denuded, with ragged pruinosity ventromedially and usually lacking hairs laterally (Fig. 14) (southern Alberta) .... ***agora*** **Teskey** (p. 175)

19. Abdomen predominantly subshiny black; tergites 2 and 3 with median and sublateral triangles of pale hairs small and extending no more than half the length of tergites (Fig. 188). Anepisternum and mid and hind femora with abundant black hairs. Costal cell and margins of crossveins and furcation of R_{4+5} moderately pigmented (western) .... ***osburni*** **(Hine)** (p. 226)

    Abdomen dull black; tergites 2 and 3 with median and sublateral triangles of pale hair larger and crossing more than half the length of tergites (Fig. 183). Anepisternum and mid and hind femora predominantly white-haired. Wing membrane clear (western plains) .... ***rhombica*** **(Osten Sacken)** (p. 234)

20. Abdominal tergites 2 and 3 with yellow to orange sublateral oblique spots and with no more than minute median pale-haired triangles. Furcation of veins R_{4+5} with distinct brown spot. Basal callus flat and wrinkled (transcontinental) .... ***lurida*** **(Fallén)** (p. 215)

Median pale triangles crossing at least half of tergites 2 and 3. Furcation of vein R_{4+5} indistinctly pigmented. Basal callus convex and smooth 21

21. Base of vein R_{4+5} usually with long spur vein. Costal cell clear (western) .... ***tetrica*** **(Marten)** in part (p. 243)

Base of vein R_{4+5} without spur vein. Costal cell pigmented (southern British Columbia and Alberta) .... ***melanorhina*** **(Bigot)** (p. 216)

22. Abdomen broadly orange brown laterally on first 3 or 4 tergites; median black stripe normally constricted on tergite 3, or at least parallel-sided; sublateral paler spots usually inconspicuous (Figs. 193–195) 23

Abdomen either not broadly orange brown laterally or, if so, with median dark area of at least tergite 2 widened to posterior margin; sublateral pale spots on abdomen often distinct 34

23. Hind tibial fringe well-developed, predominantly orange or yellowish. Basal flagellomere broad apically, with prominent dorsal angulation, and completely orange or with only slight darkening apically (Fig. 20). Body length 17–20 mm (British Columbia) .... ***californica*** **(Marten)** (p. 185)

Hind tibial fringe, if well-developed, predominantly black. Basal flagellomere either not completely orange or body length less than 17 mm 24

24. Frons 4.5–5.0 times as high as basal width, strongly narrowed ventrally. Flagellum orange. Apical palpomere strongly swollen basally, its length-to-width index 2.5–3.0 (Fig. 25) (transcontinental) .... ***epistates*** **(Osten Sacken)** (p. 193)

Frons either less than 4.5 times as high as basal width or flagellum with at least terminal annulate portion black or apical palpomere more slender 25

25. Basal flagellomere rather narrow, with obtuse dorsal angle and no dorsal excision (Fig. 17) 26

Basal flagellomere broader, with dorsal angle nearly 90° and at least a slight dorsal excision 29

26. Notopleural lobe black (southern British Columbia) .... ***atrobasis*** **(McDunnough)** (p. 180)

Notopleural lobe reddish brown 27

27. Apical palpomere slender, 4.0–4.5 times as long as greatest diameter. Frons no more than three times higher than basal width (eastern) .... ***minuscula*** **(Hine) in part** (p. 220)

Apical palpomere no more than three times as long as greatest diameter. Frons more than three times as high as basal width 28

28. Eye prominently long pilose (western coastal) .... ***sonomensis*** **(Osten Sacken)** (p. 241)

Eye sparsely short pilose (southern British Columbia and Alberta) .... ***enigmatica*** **Teskey** (p. 191)

29. Basal flagellomere with only a very shallow dorsal excision. Second palpomere about 4–4.5 times as long as greatest diameter, rather abruptly angled dorsally and sharply pointed apically (Fig. 54) (transcontinental) .... ***trepida*** **(McDunnough)** (p. 245)

Basal flagellomere with a relatively deep dorsal excision or second palpomere less than four times as long as greatest diameter and evenly rounded dorsally 30

30. Notopleural lobe usually black. Frons 2.5–3.0 times as tall as basal width (Fig. 57) (southern British Columbia) .... ***zygota*** **(Philip)** (p. 251)

Notopleural lobe reddish brown. Frons more than three times as tall as basal width 31

31. Dorsal excision of basal flagellomere deep, with dorsal process projecting forward (Fig. 15). Basal callus finely wrinkled or striated and usually connected to median callus. Frons usually more than 3.5 times as high as basal width. Abdomen with median black stripe usually rather broad and parallel-sided (transcontinental) .... ***arpadi*** **(Szilady)** (p. 177)

Dorsal excision of basal flagellomere shallower, with dorsal process not projecting forward. Basal callus smooth and not connected to median callus. Frons, except in *H. aurilimba*, usually no more than 3.5 times as high as basal width. Dorsal black stripe on abdomen narrow and tapered to tergite 3 32

32. Second palpomere creamy white and somewhat swollen basally. Frons usually rather broad and distinctly widened above (Fig. 28) (British Columbia and Alberta) .... ***fulvilateralis*** **(Macquart)** (p. 199)

Second palpomere light orange brown and only moderately swollen basally. Frons neither so broad nor so widened above (Figs. 13, 18) 33

33. Eye essentially bare. Dorsal excision of basal flagellomere shallow (Fig. 18). Second palpomere 3.5–4.0 times as long as

greatest width. Median black stripe on abdomen reduced or obsolete (Ontario and Quebec) .... ***aurilimba*** **(Stone)** (p. 182)

Eye distinctly pilose. Dorsal excision of basal flagellomere deep (Fig. 13). Second palpomere about three times as long as greatest width. Median black stripe on abdomen well developed (transcontinental) .... ***affinis*** **(Kirby)** (p. 173)

34. Abdomen black, with only median white triangles on posterior margins of tergites 2–4 (Fig. 178) (eastern) .... ***sodalis*** **(Williston)** (p. 239)

Abdomen either not extensively black or with median and sublateral pale areas 35

35. Second palpomere slender, usually over four times as long as greatest diameter 36

Second palpomere stouter basally, rarely exceeding 3.5 times its greatest diameter 41

36. Notopleural lobe black 37

Notopleural lobe brown 38

37. Proboscis long; palpus not reaching base of labellum. Median callus broadly joined to basal callus. Costal cell darkened (transcontinental) .... ***hearlei*** **(Philip)** (p. 201)

Proboscis short, nearly subequal in length to palpus. Median callus separated from basal callus. Costal cell clear or very weakly darkened (transcontinental) .... ***astuta*** **(Osten Sacken)** (p. 178)

38. Abdomen with median and sublateral whitish triangles nearly subequal in size, or median triangles larger (Fig. 169) 40

Abdomen with median pale markings absent, smaller, or less distinctive than sublateral pale spots; sublateral pale spots often quite orange or associated with extensive orange coloration of sides of tergites (Figs. 171, 174) 39

39. Basal and median callus broadly united. Basal flagellomere slender, lacking a dorsal excavation. Palpus evenly rounded dorsally (Fig. 40) (eastern) .... ***minuscula*** **(Hine)** in part (p. 220)

Basal and median callus separated. Basal flagellomere with a shallow dorsal excavation. Palpus with dorsobasal margin angled (Fig. 55) (eastern) .... ***typhus*** **(Whitney)** (p. 247)

40. Femora brownish on at least apical half. Hairs on palpus relatively long and uneven, semierect. Frons parallel-sided to slightly narrowed dorsally; basal callus usually orange brown (Fig. 27) (eastern) .... ***frosti*** **Pechuman** (p. 197)

Femora nearly completely black. Hairs on palpus short and recumbent. Frons slightly widened dorsally. Basal callus black (Fig. 44) (transcontinental) .... ***pechumani* Teskey & Thomas** (p. 228)

41. Frons about 2.5 times as tall as basal width. Second palpomere 3.3–3.5 times as long as greatest width 42

Frons no less than three times as tall as basal width. Second palpomere no more than three times as long as greatest width 43

42. Basal callus black, nearly rectangular. Notopleural lobe, femora, and sides of abdomen black (Alaska) ..... ***polaris* (Frey)** (p. 232)

Basal callus at least in part light brown, more or less rounded. Notopleural lobe, femora, and portions of sides of abdomen brownish (transcontinental) .... ***itasca* (Philip)** (p. 206)

43. Antenna with basal flagellomere slender, subequal to width of scape and pedicel (Fig. 39). Basal callus confluent with median callus over entire width of latter. Eye sparsely pilose. Femora predominantly brown. Notopleural lobe black (eastern to Saskatchewan) .... ***microcephala* (Osten Sacken)** (p. 218)

Basal flagellomere usually wider than scape or pedicel. Basal and median calli separated or only narrowly connected. Eye densely pilose. Femora black or brown. Notopleural lobe brownish 44

44. Wing with membrane of costal cell or margins of veins and crossveins or both, including furcation of R_{4+5}, distinctly darker than adjacent membranous portions of wing 45

Wing membrane hyaline 46

45. Pigmentation of wing membrane restricted to margins of crossveins and furcation of R_{4+5}. Femora completely black (transcontinental) .... ***illota* (Osten Sacken)** (p. 204)

Wing membrane pigmented in costal cell and on margins of basal veins, crossveins, and furcation of R_{4+5}. Femora brown on distal half or more (widespread but rare) .... ***brennani* (Stone)** (p. 183)

46. Abdomen orange brown laterally on first 3 or 4 tergites, with moderately broad jagged-edged median black stripe; median black stripe with overriding creamy white to yellow hairs and grayish pruinosity grouped to form median row of elongate triangles on the black stripe that cross or almost cross tergites; tergites with orange brown sides having sublateral row of oval patches of pale hairs of similar extent; lateral margins also pale-haired. Frons and gena predominantly pale-haired. Eye emerald green with 3 narrow purple bands (Fig. 45) (central plains) .... ***pediontis* (McAlpine)** (p. 230)

Abdomen not as above, or frons and gena with abundant black hairs, or eye not so extensively green, with markings usually reduced to 4 transverse green bands on a dominantly bluish purple background 47

47. Basal callus as wide as frons, strongly convex, and projecting on subcallus as small bare triangular area; frons rather distinctly widened above (ratio of dorsal to ventral width 1.3:1.45). Scape and pedicel usually blackened (Fig. 42) (Alberta) . . . . ***opaca*** **(Coquillett)** (p. 223)

Basal callus usually narrower than frons, not strongly convex, and commonly projecting on subcallus only in *C. tetrica* (Marten); frons usually only moderately to not at all widened above. Scape and pedicel usually orange 48

48. Base of vein R_4 with spur vein usually longer than preceding section of R_4. Frons 1.3–1.45 times as broad above as below. Basal flagellomere usually with shallow but distinct dorsal excavation (Fig. 53). Abdomen with median pale-haired triangles extending less than half the length of tergites; abdomen with sublateral pale markings usually having distinct oblique linear appearance. Costal cell clear (western) . . . . ***tetrica*** **(Marten)** in part (p. 243)

Base of vein R_4 usually lacking spur vein. Frons 1–1.3 times as broad above as below. Basal flagellomere usually lacking dorsal excavation (Fig. 26). Abdomen with median pale-haired triangles often more than half the length of tergites; abdomen with sublateral pale markings more nearly oval or round, and oblique inclination less accentuated. Costal cell faintly tinted (transcontinental) . . . . ***frontalis*** **(Walker)** (p. 195)

Key to species of *Hybomitra*

Males

(Males of *H. aequetincta*, *H. brennani*, and
H. polaris unknown)

1. Black species with first 3 abdominal segments mostly bright yellowish orange of uniform shade; remaining abdominal segments totally black without white hairs on incisures 2

Abdomen otherwise marked 3

2. Subcallus pruinose. Second palpomere partly orange. Frontoclypeus and thoracic pleuron usually with yellow hair.

Wing slightly pigmented (Manitoba to Quebec) .... *criddlei* **(Brooks)** (p. 190)

Subcallus denuded and shiny. Palpus black. Frontoclypeus and thoracic pleuron with black hairs. Wing distinctly pigmented (southern Ontario and Quebec) ...... *cincta* **(Fabricius)** (p. 188)

3. Abdominal tergites mostly black; all segments with posterior margins having prominent yellowish bands. Hind tibial fringe of hairs yellow 4

Abdominal tergites otherwise marked or, if only with narrow pale margins, hind tibial fringe of hairs black 5

4. Notopleural lobe black. Abdomen almost completely yellow-haired (northern Quebec) .... *aequetincta* **(Becker)**—presumed (p. 172)

Notopleural lobe reddish brown. Abdomen with yellow hairs only on pale posterior margins of segments; black hairs confined to areas of black integument (transcontinental) .... *zonalis* **(Kirby)** (p. 248)

5. Almost or entirely black, including most hairs. Palpus and sides of tergite 2 of abdomen sometimes faintly reddish; occiput, frontoclypeus, and anterior part of scutum with sparse paler hairs 6

Integument and hairing more extensively pale; at least abdominal tergites with posterior fringes of white hairs 7

6. Palpus and sides of second abdominal tergite black. Crossveins and furcation of R_{4+5} faintly pigmented. Subcallus moderately swollen and, together with gena, subshiny (southern British Columbia) .... *procyon* **(Osten Sacken)** (p. 233)

Second palpomere and sides of second abdominal tergite faintly reddish. Crossveins and furcation of R_{4+5} clear. Subcallus not excessively swollen and, like gena, pruinose and not shiny (British Columbia and Alberta) .... *lanifera* **(McDunnough)** (p. 208)

7. Abdomen black, obscurely orange to reddish laterally, but lacking distinct sublateral spots; tergites with conspicuous row of median white triangles (eastern) .....*sodalis* **(Williston)** (p. 239)

Abdomen distinctly orange laterally or with sublateral paler patches 8

8. Abdomen black; segments with posterior margins narrowly pale; tergites 1–3 with sides diffusely reddish brown but lacking median or sublateral paler patches. Second palpomere slender 9

Abdominal tergites prominently reddish brown laterally or with distinct median or sublateral pale patches. Second palpomere slender to stout 10

9. Frontoclypeus and gena predominantly white-haired. Second palpomere dominantly orange, shorter than first palpomere . . . . (eastern) ***longiglossa*** **(Philip)** (p. 213)

Frontoclypeus and gena predominantly black-haired. Second palpomere mostly black, longer than first palpomere (Alaska to Northwest Territories) . . . . ***sexfasciata*** **(Hine)** (p. 238)

10. Small dark species; subcallus protuberant, gray. Gena subshiny black. Wing with stigma pigmented (eastern Ontario) . . . . ***hinei*** **(Johnson)** (p. 202)

Differing in one or more characters from above 11

11. Abdomen broadly orange brown laterally on first 3 or 4 tergites, with orange brown coloration usually extending anterolaterally across tergite 1 to broadly contact metanotum; tergites 2 and 3 usually lacking sublateral paler oblique patches on orange sides; tergites 2 and 3 with lateral margins of median black areas parallel or narrowed posteriorly 12

Abdomen, if broadly orange brown laterally on anterior tergites, with orange brown coloration usually not extending anterolaterally to contact metepimeron; but if so, overriding sublateral paler oblique patches on orange sides of tergites 2 and 3 usually obvious, and lateral margins of median black areas on one or both of tergites 2 and 3 concave or widened posteriorly 30

12. Subcallus partly denuded and subglossy. Femora at least partly orange brown. Length of fly 14–15 mm (southern British Columbia) . . . . ***aasa*** **Philip** (p. 170)

Subcallus entirely pruinose. Femora black or length of fly more than 16 mm 13

13. Borders of crossveins and furcation of R_{4+5} prominently pigmented (widespread) . . . . ***lasiophthalma*** **(Macquart)** (p. 209)

Pigmentation of cross veins and furcation of R_{4+5} indistinct or absent 14

14. Black hairs on median black dorsal stripe of abdomen distinctly longer, more erect, and brush-like than lateral hairs (transcontinental) . . . . ***arpadi*** **(Szilady)** (p. 177)

Black hairs on median black dorsal stripe of abdomen only moderately lengthened and not distinctly brush-like or tufted 15

15. Notopleural lobe black. Basal flagellomere slender, with obtuse dorsal angle and shallow dorsal excavation 16

Notopleural lobe with at least faint tinge of reddish brown. Basal flagellomere usually with dorsal angle nearly 90° and dorsal excavation distinct 19

16. Second palpomere subcylindrical, more than twice as long as broad (southern British Columbia) . . . . ***zygota*** **Philip** (p. 251)

Second palpomere robust, subovoid, less than twice as long as broad 17

17. Second palpomere completely black-haired. Abdomen with lateral orange coloration rarely extending across tergite 1 to metanotum in same intensity as on posterior part of tergite (southern British Columbia) . . . . ***atrobasis*** **(McDunnough)** (p. 180)

Second palpomere white-haired basally. Abdomen with lateral orange coloration usually at least narrowly extending across tergite 1 to metanotum with same intensity as on posterior part of tergite 18

18. Scape and pedicel orange (British Columbia and Alberta) . . . . ***rupestris*** **(McDunnough)** (p. 236)

Scape and pedicel black or dusky (southern Alberta) . . . . ***agora*** **Teskey** (p. 175)

19. Eye with rather distinct transverse line of separation between areas of large and small ommatidia 20

Areas of large and small ommatidia not sharply differentiated 22

20. Outer fore tarsal claw longer than inner claw. Continuity of pale hairs on posterior margins of abdominal tergites broken by short interval of black hairs submedially (transcontinental) . . . . ***trepida*** **(McDunnough)** (p. 245)

Fore tarsal claws of equal length. Fringes of pale hairs on posterior margins of abdominal tergites complete 21

21. Femora and tibiae of all legs black-haired. Body length usually no more than 16 mm (British Columbia) . . . . ***captonis*** **(Martin)** (p. 186)

Femora and tibiae of mid and hind legs with some yellow hairs. Body length usually more than 16 mm (British Columbia) . . . . ***californica*** **(Martin)** (p. 185)

22. Wing clear; costal cell and furcation of R_{4+5} with faint pigmentation (transcontinental) . . . . ***frontalis*** **(Walker)** (in part) (p. 195)

Costal cell distinctly darkened; margins of veins and furcation of R_{4+5} with slight pigmentation 23

23. Second palpomere creamy to grayish white, rather stout, and usually more swollen apically 24

Second palpomere yellowish brown and of more uniform oval shape 25

24. Abdominal tergites 2 and 3 with slightly paler yellow-haired sublateral oblique patch superimposed on orange sides (transcontinental) .... ***nitidifrons*** ssp. ***nuda*** **(McDunnough)** (p. 222)

Abdominal tergites 2 and 3 with at most a few yellow hairs sublaterally, but not associated with paler areas (transcontinental) .... ***epistates*** **(Osten Sacken)** (p. 193)

25. Second and sometimes third abdominal tergite with sublateral group of yellow hairs invading middle of segment from posterior margin 26

Second and third abdominal tergites with yellow hairs restricted to posterior margins or with only a few invasive hairs 28

26. Scape, pedicel, most if not all of basal flagellomere, and apices of mid and hind femora yellowish (Ontario and Quebec) .... ***aurilimba*** **(Stone)** (p. 182)

Scape, often pedicel, at least apex of basal flagellomere and all femora black 27

27. Eye hairs dark brown or black; first and second abdominal sternites darkened (British Columbia and Alberta) .... ***fulvilateralis*** **(Macquart)** (p. 199)

Eye hairs whitish; only first abdominal sternite with small median black spot (Alberta) .... ***opaca*** **(Coquillett)** (p. 223)

28. Wing at least 13 mm long. Fore tarsal claws of equal length. Eye (relaxed) with 3 transverse greenish bands in lower half (transcontinental) .... ***affinis*** **(Kirby)** (p. 173)

Wing no more than 12 mm long. Outer fore tarsal claw longer than inner claw. Eye (relaxed) with 2 transverse greenish bands in lower half (Fig. 24) 29

29. Costal cell, margins of veins, crossveins, and furcation of R_4 and R_5 faintly pigmented. Tergite 2 with median sublateral areas lacking pale hairs (western coastal) .... ***sonomensis*** **(Osten Sacken)** (p. 241)

Only costal cell faintly pigmented. Disc of tergite 2 with sublateral patches of pale hairs connected to narrow band of similar hairs on posterior margin (southern British Columbia and Alberta) .... ***enigmatica* Teskey** (p. 191)

30. Notopleural lobe black 31

Notopleural lobe at least faintly reddish brown 35

31. Subcallus shiny black (western) .... ***osburni* (Hine)** (p. 226)

Subcallus pruinose and opaque 32

32. Femora, tibiae, and scape of antenna orange brown (Saskatchewan eastward) ....
.... ***microcephala* (Osten Sacken)** (p. 218)

At least femora and scape black 33

33. Antenna black, except for narrow base of basal flagellomere. Eye hairs pale (western plains) ... ***rhombica* (Osten Sacken)** (p. 234)

Nearly half of basal flagellomere reddish brown. Eye hairs tawny 34

34. Costal cell quite as clear as remainder of wing membrane or nearly so. Fore coxa and thoracic pleura with abundant yellowish hairs (transcontinental, western Arctic) ....
......***astuta* (Osten Sacken)** (p. 178) (and ? ***polaris* Frey**) (p. 232)

Costal cell darker than remainder of wing membrane. Fore coxa and thoracic pleura almost completely black-haired (transcontinental) .... ***hearlei* (Philip)** (p. 201)

35. Subcallus shiny black (southern British Columbia and Alberta)
.... ***melanorhina* (Bigot)** (p. 216)

Subcallus pruinose and opaque 36

36. Costal cell as clear as remainder of wing 37

Costal cell darker than remainder of wing 41

37. Anterior 4 abdominal sternites reddish brown, with (at most) small median darkened spot on sternite 2. Spur vein near base of R_4 (western) .... ***tetrica* (Marten)** (p. 243)

Anterior 2 abdominal sternites completely black or with prominent partial blackening. Spur vein often absent from base of R_4 38

38. Femora and tibiae uniformly brown 39

Femora black; tibiae reddish brown to yellow 40

39. Coxae predominantly black-haired; tergites 2 and 3 with sides distinctly reddish and sharply outlining median black stripe (transcontinental) .... ***liorhina* (Philip)** (p. 211)

Coxae mostly white-haired; tergites 2 and 3 with sides obscurely reddish; median dark stripe not sharply outlined (transcontinental) .... *itasca* **(Philip)** (p. 206)

40. Posterior half of episternum and tibiae exclusively or dominantly black-haired (transcontinental) .... *frontalis* **Walker** (in part) (p. 195)

Posterior half of anepisternum and tibiae with pale hairs prominently mixed with black hairs (central plains) .... *pediontis* **McAlpine** (p. 230)

41. Small species, not more than 12 mm long. First and usually part of second palpomere blackened; second palpomere slender. Sides of abdominal tergites 2–4 broadly orange brown. Basal flagellomere with shallow dorsal excision (eastern) .... *minuscula* **(Hine)** (p. 220)

Species usually longer than 12 mm, but if smaller, second palpomere stout and dorsal excision distinct or abdomen not broadly orange brown laterally 42

42. Bifurcation of vein R_{4+5} with distinct pigmented spot. Second palpomere very stout 43

Bifurcation of vein R_{4+5} without such a spot. Second palpomere rather slender 44

43. Hind tibiae orange brown. Abdomen rather broadly orange brown laterally. Costal cell and basal portion of wing distinctly pigmented. Claws of fore tarsi subequal (transcontinental) .... *lurida* **(Fallén)** (p. 215)

Hind tibiae dark reddish brown to black. Abdomen narrowly yellowish laterally. Costal cell and basal portion of wing lightly pigmented. Outer claw of fore tarsi about one-third longer than inner claw (transcontinental) .... *illota* **(Osten Sacken)** (p. 204)

44. Larger upper eye facets blending almost imperceptibly into ventral smaller facets. Second palpomere brown, somewhat clavate, paler at apex. Hind femur brown, basal half darkened (eastern) .... *frosti* **Pechuman** (p. 197)

Areas of large and small eye facets sharply differentiated. Second palpomere yellow to brown, subcylindrical. Hind femur variable, often completely black 45

45. Hairs on genae, pleurae, and coxae mostly white; second palpomere yellow, with white hairs laterally (eastern) .... *typhus* **(Whitney)** (p. 247)

Hairs on genae, pleurae, and coxae mostly black; second palpomere yellow brown, with black hairs laterally (transcontinental) .... *pechumani* **Teskey and Thomas** (p. 228)

Tableau d'identification des espèces du genre *Hybomitra*

Femelles

1. Espèces à la livrée noire, les trois premiers tergites principalement orange vif et les autres tout noirs (fig. 196) 2

   Tergites pas tous d'une couleur, mais ornés de motifs colorés variés ou, si les trois premiers tergites sont orange, cette couleur est aussi présente sur les côtés du tergite 4 3

2. Sous-calus pruineux; palpe orange; face et pleurites habituellement parsemés de quelques poils jaunes. Aile légèrement pigmentée (du Manitoba au Québec) .... ***criddlei* (Brooks)** (p. 190)

   Sous-calus en partie glabre et luisant (fig. 22); palpe noir; poils noirs sur la face et les pleurites. Aile plutôt fortement pigmentée (sud de l'Ontario et Québec) .... ***cincta* (Fabricius)** (p. 188)

3. Rayures ou rangées médianes et sublatérales de marques pâles manquant sur l'abdomen; bord postérieur de tous les tergites à liséré jaunâtre étroite (fig. 187). Frange postérieure de poils du tibia postérieur jaune 4

   Abdomen marqué différemment ou, si les tergites s'ornent d'un liséré surtout pâle, frange postérieure du tibia postérieur constituée de poils noirs 5

4. Pilosité abdominale presque complètement jaune. Fémur postérieur jaune sur le tiers à la moitié apicale. Lobe du notopleurite noir. Sous-calus en partie glabre (fig. 12*d*) (nord du Québec) .... ***aequetincta* (Becker)** (p. 172)

   Pilosité abdominale jaune confinée sur le bord postérieur pruineux et pâle des tergites, le poil sur le reste du tégument noir étant noir aussi. Fémur postérieur jaunâtre uniquement dans sa partie la plus apicale. Lobe du notopleurite rougeâtre. Sous-calus pruineux (fig. 56*d*) (d'un bout à l'autre du continent) .... ***zonalis* (Kirby)** (p. 248)

5. Livrée, y compris les palpes, l'antenne et tous les poils, toute noire, sauf sur l'occiput et la partie antérieure du scutum. Sous-calus et joue noir lustré (fig. 47) (sud de la Colombie-Britannique) .... ***procyon* (Osten Sacken)** (p. 233)

   Palpe de même que, habituellement en partie, les antennes et l'abdomen plus pâles, les pleurites ainsi que la tête portant de nombreux poils plus pâles. Sous-calus et joue à pruinosité grise, sauf chez *H. longiglossa* (Philip) 6

6. Antennes, thorax (y compris les pattes) et abdomen noirs de façon prédominante (Colombie-Britannique et Alberta) .... ***lanifera*** **(McDunnough)** (p. 208)

Antennes et tibias en partie rougeâtres; bord des tergites au moins modérément plus pâle; taches médianes pâles ou rougissement latéral sur au moins un tergite 7

7. Abdomen principalement noir; tergite 2 ou le 3 (ou les deux) aux côtés rougeâtres diffus, mais sans zone plus pâle ni pilosité blanche sublatérale et médiane qui soit nette; liséré très fin et très pâle sur le bord postérieur de tous les tergites (fig. 170). Palpe grêle 8

Abdomen orné de taches plus pâles, médianes, sublatérales ou les deux, ou côtés des tergites distinctement rougeâtres. Palpe de grêle à vigoureux 9

8. Sous-calus et plage médiane du clypéus glabres et lustrés. Lobe du notopleurite rougeâtre (Est) ..... ***longiglossa*** **(Philip)** (p. 213)

Sous-calus et clypéus pruineux. Lobe du notopleurite noir (de l'Alaska aux Territoires du Nord-Ouest) .... ***sexfasciata*** **(Hine)** (p. 238)

9. Sous-calus glabre et lustré 10

Sous-calus pruineux 22

10. Sous-calus enflé. Joue et clypéus généralement glabres et lustrés. Espèce de petite taille aux marques alaires foncées (est de l'Ontario) .... ***hinei*** **(Johns)** (p. 202)

Sous-calus normal. Joue et clypéus tout pruineux et sans éclat 11

11. Côtés de l'abdomen largement brun orangé, la région médiane noire étant la plus étroite sur le tergite 3 (fig. 181) 12

Côtés de l'abdomen non largement brun orangé ou région médiane foncée du tergite 3 aussi large que celle du tergite 2 14

12. Membrane alaire contiguë à toutes les nervures transversales et bifurcation de R_{4+5} parsemées d'une pigmentation foncée (espèce répandue) .... ***lasiophthalma*** **(Macquart)** (p. 209)

Membrane alaire contiguë aux nervures transversales et bifurcation de R_{4+5} non pigmentées 13

13. Calus inférieur aplati et ridé. Deuxième article du palpe plutôt enflé, environ 2,5 fois plus long que son diamètre maximal. Front pas plus de 0,6 à 0,9 mm de largeur à sa base et à la hauteur des tubercules des ocelles, respectivement (fig. 41) (d'un bout à l'autre du continent) .... ***nitidifrons*** ssp. ***nuda*** **(McDunnough)** (p. 222)

Calus inférieur d'un arrondi égal. Deuxième article du palpe environ 3 fois plus long que son diamètre maximal. Front d'au moins 0,7 à 1,0 mm de largeur à sa base et à la hauteur des tubercules des ocelles, respectivement (fig. 21) (Colombie-Britannique) .... ***captonis*** **(Marten)** (p. 186)

14. Couleur de fond du fémur en tout ou en partie brun jaune 15

    Couleur de fond du fémur uniformément noire 16

15. Cellule costale et bifurcation de R_{4+5} légèrement pigmentées; bifurcation dépourvue de nervure acuminée. Tergites orange en position sublatérale (sud de la Colombie-Britannique) .... ***aasa*** **(Philip)** (p. 170)

    Cellule costale et partie basale de R_{4+5} de teinte claire; R_{4+5} habituellement doté d'une courte nervure acuminée. Tergites sans coloration orange (d'un bout à l'autre du continent) .... ***liorhina*** **(Philip)** (p. 211)

16. Lobe du notopleurite noir; calus inférieur convexe et lisse 17

    Lobe du notopleurite habituellement brun jaunâtre; s'il est noir, le calus inférieur est aplati et modérément ridé 20

17. Couleur de fond des côtés du tergite 2 tout orange 18

    Côtés du tergite 2 tout au plus partiellement orange, mais habituellement tout noirs 19

18. Scape et pédicelle orange. Sous-calus non pruineux, brun lustré à noir dans sa partie médiane, habituellement velu sur les côtés (fig. 49) (Colombie-Britannique et Alberta) .... ***rupestris*** **(McDunnough)** (p. 236)

    Scape et pédicelle noirs. Sous-calus glabre en partie seulement, couvert de lambeaux de pruinosité en position ventromédiane et habituellement glabre sur les côtés (fig. 14) (est de l'Alberta) .... ***agora*** **Teskey** (p. 175)

19. Abdomen surtout noir assez brillant; tergites 2 et 3 ornés, en position médiane et sublatérale, de petits triangles de poils clairs qui ne s'étendent sur pas plus de la moitié de leur longueur (fig. 188). Nombreux poils noirs sur l'anépisternum et sur les fémurs des pattes médianes et postérieures. Cellule costale et marges des nervures transversales ainsi que bifurcation de R_{4+5} modérément pigmentées (Ouest) .... ***osburni*** **(Hine)** (p. 226)

    Abdomen noir terne; tergites 2 et 3 ornés, en position médiane et sublatérale, de gros triangles de poils plus pâles qui couvrent plus de la moitié de leur longueur (fig. 183). Pilosité principalement blanche sur l'anépisternum et sur les fémurs des pattes médianes et postérieures. Membrane alaire de teinte claire (plaines de l'Ouest) .... ***rhombica*** **(Osten Sacken)** (p. 234)

20. Tergites 2 et 3 ornés, en position sublatérale, de taches obliques, jaunes à orange et, en position médiane, de minuscules triangles de poils pâles seulement. Bifurcation de la nervure R_{4+5} portant une tache brune nette. Calus inférieur aplati et ridé (d'un bout à l'autre du continent) .... ***lurida*** **(Fallén)** (p. 215)

Triangles pâles en position médiane traversant au moins la moitié des tergites 2 et 3. Bifurcation de la nervure R_{4+5} vaguement pigmentée. Calus inférieur convexe et lisse 21

21. Partie basale de la nervure R_{4+5} pourvue habituellement d'une longue nervure acuminée. Cellule costale de teinte claire (Ouest) .... ***tetrica*** **(Marten)** (*partim*) (p. 243)

Partie basale de la nervure R_{4+5} sans nervure acuminée. Cellule costale pigmentée (sud de la Colombie-Britannique et Alberta) .... ***melanorhina*** **(Bigot)** (p. 216)

22. Côtés de l'abdomen largement brun orange sur les 3 ou 4 premiers tergites; normalement, constriction ou, du moins, parallélisme des côtés de la rayure noire médiane du tergite 3; taches plus pâles sublatérales habituellement peu visibles (fig. 193 à 195) 23

Abdomen aux côtés généralement d'une autre couleur que brun orange ou, dans ce cas, décoré d'une zone médiane foncée qui, sur au moins le tergite 2, va en s'élargissant jusqu'au bord postérieur; taches pâles sublatérales de l'abdomen souvent nettes 34

23. Frange du tibia postérieur bien développée, surtout orange ou jaunâtre. Article basal du flagelle élargi dans le sens apical, fortement coudé dans le plan dorsal, tout orange ou à peine foncé vers l'apex (fig. 20). Longueur du corps : de 17 à 20 mm (Colombie-Britannique) .... ***californica*** **(Marten)** (p. 185)

Si elle est bien développée, frange du tibia postérieur surtout noire. Article basal du flagelle orange en partie ou longueur du corps de moins de 17 mm 24

24. Front 4,5 à 5,0 fois plus haut que large à sa base, fortement étréci dans le sens ventral. Flagelle orange. Article apical du palpe fortement enflé vers sa partie basale, le rapport de sa longueur à sa largeur étant de 2,5 à 3,0 (fig. 25) (d'un bout à l'autre du continent) .... ***epistates*** **(Osten Sacken)** (p. 193)

Front moins de 4,5 fois plus haut que large à sa base; flagelle noir, tout au moins dans sa partie terminale annelée ou article apical du palpe plus grêle 25

25. Article basal du flagelle plutôt étroit, à angle dorsal obtus et sans excision dorsale (fig. 17) 26

Article basal du flagelle large, à angle dorsal presque droit et à excision dorsale au moins légère 29

26. Lobe du notopleurite noir (sud de la Colombie-Britannique) .... ***atrobasis*** **(McDunnough)** (p. 180)

Lobe du notopleurite brun rougeâtre 27

27. Article apical du palpe grêle, 4,0 à 4,5 fois plus long que son diamètre maximal. Front pas plus de 3 fois plus haut que large à sa base (Est) .... ***minuscula*** **(Hine)** (*partim*) (p. 220)

Article apical du palpe pas plus de 3 fois plus long que son diamètre maximal. Front plus de 3 fois plus haut que large à sa base 28

28. Oeil principalement à pilosité longue (côte ouest) .... ***sonomensis*** **(Osten Sacken)** (p. 241)

Oeil à pilosité courte et clairsemée (sud de la Colombie-Britannique et Alberta) .... ***enigmatica*** **Teskey** (p. 191)

29. Article basal du flagelle à excision dorsale très superficielle. Deuxième article du palpe environ 4 à 4,5 fois plus long que son diamètre maximal, brusquement coudé dans le plan dorsal et très acéré (fig. 54) (d'un bout à l'autre du continent) .... ***trepida*** **(McDunnough)** (p. 245)

Article basal du flagelle à excision dorsale relativement profonde ou deuxième article du palpe moins de 4 fois plus long que son diamètre maximal et à courbure constante dans le plan dorsal 30

30. Lobe du notopleurite habituellement noir. Front 2,5 à 3,0 fois plus haut que large à sa base (fig. 57) (sud de la Colombie-Britannique) .... **zygota Philip** (p. 251)

Lobe du notopleurite brun rougeâtre. Front plus de 3 fois plus haut que large à sa base 31

31. Excision dorsale de l'article basal du flagelle profonde; projection vers l'avant de l'appendice dorsal (fig. 15). Calus inférieur finement ridé ou strié et habituellement relié au calus médian. Front habituellement plus de 3,5 fois plus haut que large à sa base. Habituellement, rayure médiane noire de l'abdomen plutôt large et à côtés parallèles (d'un bout à l'autre du continent) .... **arpadi (Szilady)** (p. 177)

Excision dorsale de l'article basal du flagelle peu profonde, l'appendice dorsal ne se projetant pas vers l'avant. Calus inférieur lisse, non relié au calus médian. Front habituellement pas plus de 3,5 fois plus haut que large à sa base, sauf chez le H. aurilimba. Rayure dorsale noire de l'abdomen étroite et effilée en direction du tergite 3 32

32. Deuxième article du palpe blanc crème et quelque peu enflé dans sa partie basale. Front habituellement plutôt ample et nettement

élargi sur le dessus (fig. 28) (Colombie-Britannique et Alberta) .... ***fulvilateralis*** **(Macquart)** (p. 199)

Deuxième article du palpe brun orangé clair, sa partie basale n'étant que modérément enflée. Front ni si ample ni si élargi sur le dessus (fig. 13, 18) 33

33. Oeil essentiellement glabre. Excision dorsale de l'article basal du flagelle peu profonde (fig. 18). Deuxième article du palpe 3,5 à 4,0 fois plus long que sa largeur maximale. Rayure médiane noire de l'abdomen réduite ou atrophiée (Ontario et Québec) .... ***aurilimba*** **(Stone)** (p. 182)

Oeil nettement pileux. Excision dorsale de l'article basal du flagelle profonde (fig. 13). Deuxième article du palpe environ 3 fois plus long que sa largeur maximale. Rayure médiane noire de l'abdomen bien développée (d'un bout à l'autre du continent) .... ***affinis*** **(Kirby)** (p. 173)

34. Abdomen noir, avec seulement des triangles blancs, en position médiane sur le bord postérieur des tergites 2 à 4 (fig. 178) (Est) .. .. ***sodalis*** **(Williston)** (p. 239)

Abdomen partiellement noir ou orné de zones pâles en position médiane ou sublatérale 35

35. Deuxième article du palpe grêle, habituellement plus de 4 fois plus long que son diamètre maximal 36

Deuxième article du palpe robuste dans sa partie basale, rarement plus de 3,5 fois plus long que son diamètre maximal 41

36. Lobe du notopleurite noir 37

Lobe du notopleurite brun 38

37. Trompe longue; palpe n'atteignant pas la base du labelle. Calus médian uni par une soudure large au calus inférieur. Cellule costale foncée (d'un bout à l'autre du continent) .... ***hearlei*** **(Philip)** (p. 201)

Trompe courte, presque aussi longue que le palpe. Calus médian coupé du calus inférieur. Cellule costale de teinte claire ou très peu foncée (d'un bout à l'autre du continent) .... ***astuta*** **(Osten Sacken)** (p. 178)

38. Triangles abdominaux blanchâtres en position médiane ou sublatérale presque de dimensions égales ou triangles médians plus gros (fig. 169) 40

Marques abdominales pâles en position médiane plus petites ou moins nettes que les taches sublatérales pâles; celles-ci souvent tout orange ou coïncidant avec une coloration orange étendue des côtés des tergites (fig. 171, 174) 39

39. Calus inférieur et médian unis par une large soudure. Article basal du flagelle grêle, sans creux dorsal. Palpe à courbure dorsale constante (fig. 40) (Est) .... ***minuscula*** **(Hine)** (*partim*) (p. 220)

Calus inférieur et médian séparés. Article basal du flagelle à creux dorsal superficiel. Bord dorsobasal du palpe coudé (fig. 55) (Est) .... ***typhus*** **(Whitney)** (p. 247)

40. Fémur brunâtre, du moins sur sa moitié apicale. Poils du palpe relativement longs, mais inégaux, semi-dressés. Front aux côtés parallèles ou s'étrécissant un peu dans le plan dorsal; calus inférieur habituellement brun orangé (fig. 27) (Est) .... ***frosti*** **Pechuman** (p. 197)

Fémur presque tout noir. Poils du palpe courts, couchés. Front s'élargissant un peu dans le plan dorsal. Calus inférieur noir (fig. 44) (d'un bout à l'autre du continent) .... ***pechumani*** **Teskey & Thomas** (p. 228)

41. Front environ 2,5 fois plus haut qu'il n'est large à sa base. Deuxième article du palpe 3,3 à 3,5 fois plus long que sa largeur maximale 42

Front pas moins de 3 fois plus haut qu'il n'est large à sa base. Deuxième article du palpe pas plus de 3 fois plus long que sa largeur maximale 43

42. Calus inférieur noir, presque rectangulaire. Lobe du notopleurite, fémur et côtés de l'abdomen noirs (Alaska) .... ***polaris*** **(Frey)** (p. 232)

Calus inférieur au moins partiellement brun clair, plus ou moins arrondi. Lobe du notopleurite, fémur et côtés de l'abdomen brunâtres (d'un bout à l'autre du continent) .... ***itasca*** **(Philip)** (p. 206)

43. Article basal du flagelle de l'antenne grêle, presque aussi large que le scape et le pédicelle (fig. 39). Calus inférieur confondu avec le calus médian sur toute la largeur de ce dernier. Pilosité de l'oeil clairsemée. Fémur principalement brun. Lobe du notopleurite noir (Est jusqu'en Saskatchewan) .... ***microcephala*** **(Osten Sacken)** (p. 218)

Article basal du flagelle habituellement plus large que le scape et le pédicelle. Calus inférieur et médian séparés ou unis par un isthme étroit. Pilosité de l'oeil serrée. Fémur noir ou brun. Lobe du notopleurite brunâtre 44

44. Membrane de la cellule costale, bordure des nervures ou des nervures transversales ou les deux, y compris la bifurcation de R_{4+5}, nettement plus foncés que les parties contiguës de la membrane alaire 45

Membrane alaire transparente 46

45. Pigmentation de la membrane alaire confinée à la bordure des nervures transversales et à la bifurcation R_{4+5}. Fémur tout noir (d'un bout à l'autre du continent) .... **illota** **(Osten Sacken)** (p. 204)

Cellule costale, bordure des nervures longitudinales et transversales ainsi que la bifurcation R_{4+5}, pigmentées. Fémur brun sur au moins sa moitié apicale (rare malgré une vaste aire de répartition) .... **brennani** **(Stone)** (p. 183)

46. Abdomen aux côtés brun orangé sur les 3 ou 4 premiers tergites, la rayure médiane noire étant modérément large et sa bordure, dentelée; sur cette rayure, prédominance des poils blanc crème à jaunes et des plages de pruinosité grisâtre groupés de façon à former une rangée médiane de triangles allongés qui traversent ou traversent presque les tergites. Les tergites aux côtés brun orangé ornés d'une rangée sublatérale de figures ovales de poils pâles d'étendue semblable; pilosité des marges latérales pâle aussi. Pilosité du front et de la joue surtout pâle. Oeil vert émeraude portant 3 bandes pourpres étroites (fig. 45) (plaines centrales) .... **pediontis** **(McAlpine)** (p. 230)

Abdomen ne correspondant pas à la description ci-dessus, front et joue à poils noirs abondants ou oeil pas entièrement vert, cette couleur se limitant habituellement à 4 bandes transversales barrant un fond principalement pourpre bleuâtre 47

47. Calus inférieur de la largeur du front, très convexe et dont la projection sur le sous-calus prend la forme d'un petit triangle glabre; front plutôt nettement élargi sur le dessus (le rapport de la largeur dorsale à la largeur ventrale étant 1,3/1,45). Scape et pédicelle habituellement noircis (fig. 42) (Alberta) .... **opaca** **(Coquillett)** (p. 223)

Calus inférieur habituellement plus étroit que le front, pas si convexe et dont la projection vers le sous-calus n'est observée que chez le *C. tetrica* (Marten); front habituellement peu ou pas élargi sur le dessus. Scape et pédicelle habituellement orange 48

48. Partie basale de la nervure R_4 ramifiée en nervure acuminée habituellement plus longue que la partie antérieure de R_4. Front 1,3 à 1,45 fois plus large sur le dessus que sur le dessous. Face dorsale de l'article basal du flagelle habituellement creusée de façon superficielle mais nette (fig. 53). Sur l'abdomen, triangles médians à pilosité pâle s'étendant sur moins de la moitié de la longueur des tergites; marques sublatérales pâles de l'abdomen habituellement alignées de façon nettement oblique. Cellule costale de teinte claire (Ouest) .... **tetrica** **(Marten)** (*partim*) (p. 243)

Partie basale de la nervure R_4 habituellement dépourvue de nervure acuminée. Front 1,0 à 1,3 fois plus large sur le dessus que sur le dessous. Face dorsale de l'article basal du flagelle habituellement non creusée (fig. 26). Sur l'abdomen, triangles médians à pilosité pâle souvent plus longs que la demi-longueur des tergites; marques sublatérales pâles de l'abdomen davantage ovales ou rondes, mais d'obliquité moins prononcée. Cellule costale faiblement teintée (d'un bout à l'autre du continent) .... ***frontalis*** **(Walker)** (p. 195)

Tableau d'identification des espèces du genre *Hybomitra*

Mâles

(mâles de *H. aequetincta*, de *H. brennani*
et de *H. polaris* inconnus)

1. Espèces à la livrée noire, aux trois premiers segments abdominaux d'une teinte uniforme d'orange jaunâtre vif, surtout; les autres segments abdominaux tout noirs, sans poils blancs sur les incisions 2

   Marques abdominales différentes 3

2. Sous-calus pruineux. Deuxième article du palpe orange en partie. Pilosité du frontoclypéus et du pleurite thoracique habituellement jaune. Aile légèrement pigmentée (du Manitoba au Québec) .... ***criddlei*** **(Brooks)** (p. 190)

   Sous-calus glabre et brillant. Palpe noir. Pilosité du frontoclypéus et du pleurite thoracique noire. Aile nettement pigmentée (sud de l'Ontario et Québec) .... ***cincta*** **(Fabricius)** (p. 188)

3. Tergites surtout noirs; liséré postérieur de tous les segments visiblement jaunâtre. Frange pileuse du tibia postérieur jaune 4

   Tergites portant des marques différentes ou, sinon, ornés d'un fin liséré pâle; frange de poils du tibia postérieur noire 5

4. Lobe du notopleurite noir. Pilosité de l'abdomen presque toute jaune (nord du Québec) .... ***aequetincta*** **(Becker)** (présumément) (p. 172)

   Lobe du notopleurite brun rougeâtre. Pilosité abdominale jaune seulement sur le liséré postérieur des segments; poils noirs confinés dans les zones tégumentaires noires (d'un bout à l'autre du continent) .... ***zonalis*** **(Kirby)** (p. 248)

5. Livrée toute noire ou presque, y compris la plupart des poils. Palpe et côtés du tergite 2 de l'abdomen parfois faiblement rougeâtres; sur l'occiput, le frontoclypéus et la partie antérieure du scutum, poils plus pâles clairsemés 6

Tégument et pilosité pâles plus étendus; poils blancs, au moins, sur le liséré postérieur des tergites 7

6. Palpe et côtés du tergite 2 noirs. Nervures transversales et bifurcation de R_{4+5} faiblement pigmentées. Sous-calus modérément enflé et, ainsi que la joue, presque brillant (sud de la Colombie-Britannique .... ***procyon*** **(Osten Sacken)** (p. 233)

Deuxième article du palpe et côtés du tergite 2 faiblement rougeâtres. Nervures transversales et bifurcation de R_{4+5} de teinte claire. Sous-calus pas trop enflé et, ainsi que la joue, pruineux et non brillant (Colombie-Britannique et Alberta) .... ***lanifera*** **(McDunnough)** (p. 208)

7. Abdomen noir, aux côtés obscurément orange à rougeâtres, mais sans tache sublatérale nette; tergites ornés d'une rangée très visible de triangles blancs en position médiane (Est) .... ***sodalis*** **(Williston)** (p. 239)

Abdomen nettement orange sur les côtés ou orné de plages sublatérales plus pâles 8

8. Abdomen noir; bord postérieur des segments souligné d'un liséré pâle; côtés des tergites 1 à 3 d'un brun rougeâtre diffus, mais sans les plages médianes ou sublatérales pâles. Deuxième article du palpe grêle 9

Tergites surtout brun rougeâtre sur les côtés ou portant des plages pâles distinctes en position médiane ou sublatérale. Deuxième article du palpe grêle à robuste 10

9. Pilosité du frontoclypéus et de la joue surtout blanche. Deuxième article du palpe surtout orange, plus court que le premier (Est) .... ***longiglossa*** **(Philip)** (p. 213)

Pilosité du frontoclypéus et de la joue surtout noire. Deuxième article du palpe surtout noir, plus long que le premier (de l'Alaska aux Territoires du Nord-Ouest) .... ***sexfasciata*** **(Hine)** (p. 238)

10. Espèce de petite taille, à la livrée foncée; sous-calus protubérant, gris. Joue d'un noir assez luisant. Ailes aux stigmas pigmentés (est de l'Ontario) .... ***hinei*** **(Johnson)** (p. 202)

Espèces différant par au moins un des caractères précités 11

11. Abdomen largement brun orangé sur les côtés des 3 ou 4 premiers tergites, la coloration s'étendant habituellement, dans le sens antérolatéral, au-delà du premier tergite de façon à entrer

amplement en contact avec le métanotum; tergites 2 et 3 habituellement dépourvus de plages sublatérales pâles, disposées obliquement sur les côtés orange; sur les tergites 2 et 3, bords latéraux des zones médianes noires parallèles ou s'étrécissant dans le sens postérieur 12

Si la coloration de l'abdomen est largement brun orangé sur les côtés des tergites antérieurs, elle ne s'étend habituellement pas, dans le sens antérolatéral, au point d'entrer amplement en contact avec le métépimère; mais si c'est le cas, les plages obliques pâles, en position sublatérale, prédominantes, sur les côtés orange des tergites 2 et 3, sont habituellement évidentes; sur le tergite 2 ou 3 ou sur les deux, bordure latérale des zones médianes noires concave ou s'élargissant dans le sens postérieur 30

12. Sous-calus glabre et assez lustré. Fémur au moins partiellement brun orangé. Longueur de la mouche : de 14 à 15 mm (sud de la Colombie-Britannique) .... ***aasa* Philip** (p. 170)

Sous-calus tout pruineux. Fémur noir ou longueur de la mouche supérieure à 16 mm 13

13. Bordure des nervures transversales et bifurcation de R_{4+5} très pigmentées (espèce répandue) .... ***lasiophthalma* (Macquart)** (p. 209)

Pigmentation des nervures transversales et de la bifurcation R_{4+5} indistincte ou absente 14

14. Poils noirs de la rayure médiodorsale noire de l'abdomen nettement plus longs, plus dressés et plus en brosse que les poils latéraux (d'un bout à l'autre du continent) .... ***arpadi* (Szilady)** (p. 177)

Poils noirs de la rayure médiodorsale noire de l'abdomen modérément longs, pas nettement en brosse ni en touffe 15

15. Lobe du notopleurite noir. Article basal du flagelle grêle, formant un angle aigu et creusé superficiellement dans le plan dorsal 16

Lobe du notopleurite faiblement teinté de brun rougeâtre. Article basal du flagelle habituellement coudé presque à angle droit et creux dorsal net 19

16. Deuxième article du palpe quasi cylindrique, plus de deux fois plus long que large (sud de la Colombie-Britannique) .... ***zygota* (Philip)** (p. 251)

Deuxième article du palpe robuste, de forme presque ovoïde, moins de deux fois plus long que large 17

17. Poils du deuxième article du palpe tout noirs. Sur l'abdomen, coloration latérale orange traversant rarement le tergite 1 jusqu'au métanotum à la même intensité que sur la partie postérieure du tergite (sud de la Colombie-Britannique) .... ***atrobasis*** **(McDunnough)** (p. 180)

Poils de la base du deuxième article du palpe blancs. Sur l'abdomen, coloration latérale orange traversant, au moins sur un front étroit, le tergite 1 jusqu'au métanotum à la même intensité que sur la partie postérieure du tergite 18

18. Scape et pédicelle orange (Colombie-Britannique et Alberta) .... ***rupestris*** **(McDunnough)** (p. 236)

Scape et pédicelle noirs ou brun foncé (sud de l'Alberta) .... ***agora*** **Teskey** (p. 175)

19. Zones à petites et à grandes facettes de l'oeil séparées par une ligne transversale plutôt nette 20

Zones à petites et à grandes facettes pas nettement séparées 22

20. Ongle extérieure du tarse antérieur plus longue que l'ongle intérieur. Entre les poils pâles du bord postérieur des tergites, courte solution de continuité constituée, en position presque médiane, par des poils noirs (d'un bout à l'autre du continent) .... ***trepida*** **(McDunnough)** (p. 245)

Ongles du tarse antérieur de même longueur. Frange de poils du bord postérieur des tergites toute pâle 21

21. Pilosité de tous les fémurs et tibias noire. Longueur du corps habituellement de 16 mm au plus (Colombie-Britannique) .... ***captonis*** **(Martin)** (p. 186)

Pilosité de tous les fémurs et tibias comportant des poils jaunes. Longueur du corps habituellement de plus de 16 mm (Colombie-Britannique) .... ***californica*** **(Martin)** (p. 185)

22. Aile de teinte claire; cellule costale et bifurcation de R_{4+5} faiblement pigmentées (d'un bout à l'autre du continent) .... ***frontalis*** **(Walker)** (partim) (p. 195)

Cellule costale nettement foncée; bordure des nervures et de la bifurcation de R_{4+5} légèrement pigmentée 23

23. Deuxième article du palpe blanc crème à blanc grisâtre, plutôt robuste et habituellement plus enflé dans le sens apical 24

Deuxième article du palpe brun jaunâtre et d'une forme ovale plus uniforme 25

24. Tergites 2 et 3 aux côtés orange auxquels se superposent une plage sublatérale oblique, pâle, aux poils jaunes (d'un bout à

l'autre du continent) .... ***nitidifrons*** sous-esp. ***nuda*** **(McDunnough)** (p. 222)

Tergites 2 et 3 possédant, au plus, quelques poils jaunes sublatéraux, mais qui ne coïncident pas avec des zones pâles (d'un bout à l'autre du continent) .... ***epistates*** **(Osten Sacken)** (p. 193)

25. Tergite 2 et, parfois, le 3 comportant un groupement sublatéral de poils jaunes envahissant le milieu du segment à partir du bord postérieur 26

Sur les tergites 2 et 3, poils jaunes cantonnés, pour la plupart, sur le bord postérieur 28

26. Scape, pédicelle et la plupart des articles basals des flagelles, sinon tous, ainsi que les apex des fémurs médians et postérieurs jaunâtres (Ontario et Québec) .... ***aurilimba*** **(Stone)** (p. 182)

Scape, le pédicelle souvent, au moins l'apex de l'article basal du flagelle et tous les fémurs sont noirs 27

27. Poils oculaires brun foncé ou noirs; premier et deuxième sternites abdominaux foncés (Colombie-Britannique et Alberta) .... ***fulvilateralis*** **(Macquart)** (p. 199)

Poils oculaires blanchâtres; premier sternite abdominal seulement ponctué d'une petite tache noire en position médiane (Alberta) .... ***opaca*** **(Coquillett)** (p. 223)

28. Aile d'au moins 13 mm de long. Ongles du tarse antérieur de longueur égale. Trois bandes transversales verdâtres dans la moitié inférieure de l'oeil (relâché) (d'un bout à l'autre du continent) .... ***affinis*** **(Kirby)** (p. 173)

Aile d'au plus 12 mm de long. Ongle extérieur du tarse antérieur plus longue que l'ongle intérieur. Deux bandes transversales verdâtres dans la moitié inférieure de l'oeil (relâché) (fig. 24) 29

29. Cellule costale ainsi que bordures des nervures longitudinales et transversales, et bifurcation de R_4 et de R_5 faiblement pigmentées. Tergite 2 et les zones médio-sublatérales sans poil pâle (côte de l'Ouest) ...... ***sonomensis*** **(Osten Sacken)** (p. 241)

Seule la cellule costale est faiblement pigmentée. Disque du tergite 2 comportant 2 plages sublatérales de poils pâles reliées à une bande étroite de poils semblables sur le bord postérieur (sud de la Colombie-Britannique et Alberta) .... ***enigmatica*** **Teskey** (p. 191)

30. Lobe du notopleurite noir 31

Lobe du notopleurite au moins faiblement brun rougeâtre 35

31. Sous-calus noir luisant (Ouest) .... ***osburni* (Hine)** (p. 226)
Sous-calus pruineux et opaque 32

32. Fémurs, tibias et scape brun orangé (de la Saskatchewan vers l'est) .... ***microcephala* (Osten Sacken)** (p. 218)
Fémurs et scape, au moins noirs 33

33. Antenne noire, sauf la base étroite des articles basals des flagelles. Pilosité des yeux pâle (plaines de l'ouest) .... ***rhombica* (Osten Sacken)** (p. 234)
Près de la moitié de l'article basal du flagelle brun rougeâtre. Pilosité des yeux fauve 34

34. Cellule costale de teinte tout aussi claire, ou peu s'en faut, que le reste de la membrane alaire. Pilosité de la hanche antérieure et des pleurites thoraciques jaunâtre et abondante (d'un bout à l'autre du continent, ouest de l'Arctique) .... ***astuta* (Osten Sacken)** (p. 178) (et ? ***polaris* Frey**) (p. 232)
Cellule costale plus foncée que le reste de la membrane alaire. Poils de la hanche antérieure et des pleurites thoraciques presque tous noirs (d'un bout à l'autre du continent) .... ***hearlei* (Philip)** (p. 201)

35. Sous-calus noir luisant (sud de la Colombie-Britannique et de l'Alberta) .... ***melanorhina* (Bigot)** (p. 216)
Sous-calus pruineux et opaque 36

36. Cellule costale de teinte aussi claire que le reste de l'aile 37
Cellule costale de teinte aussi foncée que le reste de l'aile 41

37. Les 4 sternites abdominaux antérieurs brun rougeâtre, le sternite 2 comportant (au plus) une petite tache médiane foncée. Nervure acuminée près de la partie basale de R_4 (Ouest) .... ***tetrica* (Marten)** (p. 243)
Les 2 sternites abdominaux antérieurs tout noirs ou surtout noirs. Nervure acuminée manquant souvent à la partie basale de R_4 38

38. Fémurs et tibias uniformément bruns 39
Fémurs noirs; tibias brun rougeâtre à jaune 40

39. Pilosité des hanches surtout noire; tergites 2 et 3 aux côtés nettement rougeâtres et faisant nettement ressortir la rayure médiane noire (d'un bout à l'autre du continent) .... ***liorhina* (Philip)** (p. 211)
Pilosité des hanches surtout blanche; tergites 2 et 3 aux côtés obscurément rougeâtres; rayure médiane noire ne ressortant pas

nettement (d'un bout à l'autre du continent) .... *itasca* **(Philip)** (p. 206)

40. Pilosité de la moitié postérieure de l'épisternum et des tibias exclusivement ou surtout noire (d'un bout à l'autre du continent) .... *frontalis* **Walker** (*partim*) (p. 195)

Poils pâles de la moitié postérieure de l'anépisternum et des tibias mêlés surtout de poils noirs (plaines du Centre) .... *pediontis* **McAlpine** (p. 230)

41. Espèce de petite taille, dont la longueur ne dépasse pas 12 mm. Premier article du palpe et, habituellement, une partie du deuxième foncés; deuxième article grêle. Côtés des tergites 2 à 4 amplement brun orangé. Sur l'article basal du flagelle, excision dorsale superficielle (Est) .... *minuscula* **(Hine)** (p. 220)

Espèces habituellement de plus de 12 mm de longueur, mais, chez celles de longueur inférieure, deuxième article du palpe robuste et excision dorsale distincte ou abdomen aux côtés pas entièrement brun orangé 42

42. Bifurcation de la nervure R_{4+5} portant une tache pigmentée nette. Deuxième article du palpe très robuste 43

Bifurcation de la nervure R_{4+5} sans tache du genre. Deuxième article du palpe plutôt grêle 44

43. Tibia postérieur brun orangé. Côtés de l'abdomen largement de la même couleur. Cellule costale et partie basale de l'aile nettement pigmentées. Ongles des tarses antérieurs presque de longueur égale (d'un bout à l'autre du continent) .... *lurida* **(Fallén)** (p. 215)

Tibia postérieur brun rougeâtre foncé à noir. Côtés de l'abdomen jaunâtres sur une zone étroite. Cellule costale et partie basale de l'aile légèrement pigmentées. Ongle extérieur des tarses antérieurs plus long du tiers que l'ongle intérieur (d'un bout à l'autre du continent) .... *illota* **(Osten Sacken)** (p. 204)

44. Grosses facettes supérieures et petites facettes ventrales de l'oeil s'interpénétrant imperceptiblement. Deuxième article du palpe brun, quelque peu claviforme, plus pâle à son apex. Fémur postérieur brun, sa moitié basale foncée (Est) .... *frosti* **Pechuman** (p. 197)

Zones des grosses et petites facettes nettement différenciées. Deuxième article du palpe jaune à brun, presque cylindrique. Couleur du fémur postérieur variable, souvent toute noire 45

45. Poils de la joue, des pleurites et des hanches surtout blancs; deuxième article du palpe jaune, portant, latéralement, des poils blancs (Est) .... *typhus* **(Whitney)** (p. 247)

Poils de la joue, des pleurites et des hanches surtout noirs; deuxième article du palpe brun jaune, portant, latéralement, des poils noirs (d'un bout à l'autre du continent) .... *pechumani* **Teskey & Thomas** (p. 228)

Hybomitra aasa Philip

Fig. 11; Map 37

Hybomitra aasa Philip 1954*a*:28.

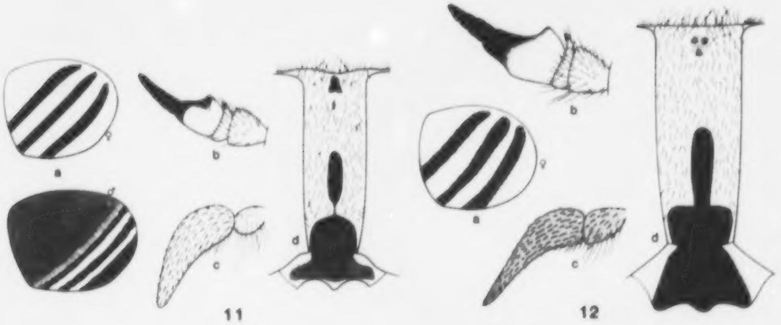
Female. Length 14–15 mm. Eye sparsely short pilose, predominantly green, with three transverse purplish blue stripes (Fig. 11*a*). Frons 3.2–4.0 times as long as basal width, widened above; basal callus reddish brown to black, subquadrate, often narrowly connected to oval or broadly elliptical black median callus. Subcallus partly denuded, reddish brown. Antenna with scape and pedicel yellowish brown, black-haired; basal flagellomere mostly orange, slightly longer than wide, with slightly obtuse dorsal angle and shallow excavation; apical flagellomeres black, longer than basal flagellomere. Second palpomere creamy white, about 2.6 times as long as greatest width, with black and white hairs (Fig. 11).

Thorax mainly gray to black; notopleural lobe and upper pleural regions yellowish orange. Legs predominantly brownish; coxae and base of femora grayish black. Wing with costal cell and furcation of R_{4+5} faintly pigmented.

Abdomen with first 4 or 5 tergites dull orange brown laterally or sublaterally, narrowly black medially and laterally; tergite 2 with black median bisected by faint grayish line; tergites with posterior margin having pale hair patches medially and laterally. Sternites extensively yellowish orange to brownish gray.

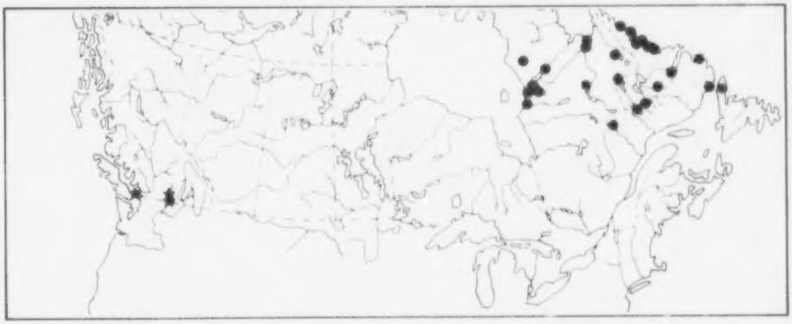
Male. Similar to female except as follows: Eye densely white pilose; dorsomedial ommatidia moderately enlarged but not sharply differentiated from smaller ventral ommatidia, with 3 narrow green stripes in ventral half (Fig. 11*b*). Scape with short blunt dorsoapical projection; basal flagellomere more slender. Subcallus partly denuded and shiny. Abdomen more broadly orange laterally on tergites 1–4, with progressively smaller median black triangles. Sternites orange; sternites 1 and 2 with median black spots.

Remarks. The female of this species is most likely to be confused with *H. captonis* (Marten) but is normally smaller, with more extensively reddish femora and more dominant black hairs on the reddish sides of the abdomen. Also, pale grayish median spots on tergites are usually visible in *H. aasa* but not in *H. captonis*.



Figs. 11, 12. Head features of *Hybomitra aasa* (11) and *H. aequetincta* (12).

Distribution. Okanagan Valley and Galiano Island, Straits of Georgia, B.C. (Map 37), south to California. The few Canadian specimens known were collected from late June to July.



Map 37. Collection localities of *Hybomitra aasa* (★) and *H. aequetincta* (●).

Hybomitra aequetincta (Becker)

Fig. 12; Map 37

Therioplectes aequetincta Becker, 1900:8.

Tabanus flavipes Wiedemann, 1828:137 (*Tabanus*; preocc. Gravenhorst, 1807).

Tabanus nigrotuberculatus Fairchild, 1934:139 (*Tabanus*, new name for *flavipes* Wiedemann).

Hybomitra aequetincta: Philip, 1947:291.

Female. Length 14–18 mm. Eye densely short-haired, with 3 purple bands on dull green background; central band narrower and tapered medially. Frons about three times as tall as basal width, widened above; basal callus usually slightly wider than high, shiny reddish brown, rounded above, narrowly connected to oval black median callus and not touching eyes. Subcallus denuded medially, concolorous with basal callus. Antenna reddish brown, paler on basal half of first flagellomere; scape and pedicel black-haired; first flagellomere stout, slightly longer than wide, with dorsal angle acute and excision prominent; terminal flagellomeres subequal in length to first flagellomere. Second palpomere slender, four times as long as wide (Fig. 12), dark brown to black, with black hairs.

Thorax with scutum and notopleural lobes black; scutum without usual longitudinal stripes and, together with upper anepisternum, mainly black-haired; remainder of pleura and scutellum mainly white-haired. Legs mainly black; apical third or half of femora, all tibiae, and mid and hind tarsi reddish; legs with hair mainly concolorous with integument; black coxae bearing black and pale hairs and hind tibia bearing white fringe. Wing with costal cell and vein margins lightly pigmented.

Abdomen extensively black; segments with hind margins, both anteriorly and posteriorly, narrowly yellow; hairs completely yellowish white; sides of tergite 2 usually with reddish spot.

Male. Not seen and apparently none are present in North American museums. Osten Sacken (1876) briefly describes males of *Tabanus flavipes* Wiedemann, a synonym of *H. aequetinctus*, as having the sides of the second abdominal tergite reddish and the large and small eye facets well marked. Krober (1925) said the male closely resembled the female.

Remarks. This species can be confused only with *H. zonalis* (Kirby). Refer to that species for distinguishing features.

Distribution. The species has a Holarctic distribution, with the Nearctic elements confined to northern Quebec and Labrador (Map 37) and the Palaearctic segment distributed across Siberia but absent from northern Scandinavia. Collection dates extend from mid June to near the middle of August.

Hybomitra affinis (Kirby)

Figs. 13, 194; Map 38

Tabanus affinis Kirby, 1837:313.
Tabanus triligatus Walker, 1854:183.
Hybomitra affinis: Philip, 1947:272.

Female. Length 16–19 mm. Eye with short pubescence, dark bluish purple, with 4 transverse green stripes. Frons black-haired, grayish yellow pruinose, 3.0–3.5 times as long as basal width, moderately widened above; median and basal calli usually separated, with latter distinctly narrower than frons.

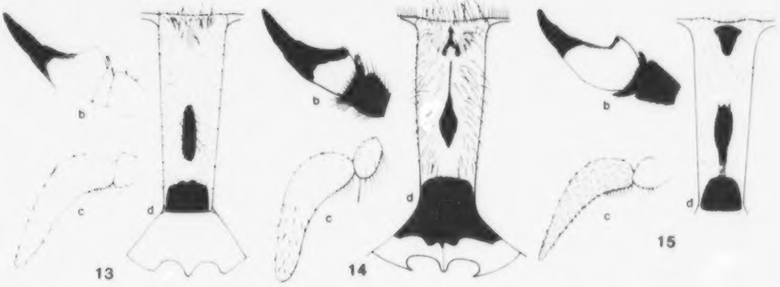
Antenna with scape, pedicel, and basal flagellomere usually predominantly orange; terminal flagellomeres black; basal flagellomere with strong dorsal angle and prominent dorsal excavation. Second palpomere yellowish brown, 3.0–3.8 times as long as greatest width, with short recumbent mainly black hairs (Fig. 13).

Thorax black with faint scutal stripes; notopleural lobe and usually anepisternum more or less reddish; pleura whitish pruinose. Fore legs and most of mid and hind femora black; remainder of legs orange brown. Wing with costal cell yellow; basal cells and margins of veins more distally, faintly pigmented.

Abdomen broadly orange laterally on first 4 tergites, with median black stripe tapering to tergite 3 and remaining tergites black; tergites with posterior margins narrowly pale pruinose; tergites with yellow hair expanding medially to small triangles and sublaterally, at least on tergite 2, forming oblique patches (Fig. 194). Sternite 1, median patch on sternite 2, and all of sternites 5 and 6 black, with other parts orange; sternites 1–4 mainly yellow-haired, with scattered black hair medially.

Male. Differing from female as follows: Eye with three greenish bands in lower half; upper ommatidia somewhat larger but not sharply differentiated from lower ones. Basal flagellomere more slender, usually with reduced orange coloration. Clypeus and genae with more abundant black hair; scutum almost lacking longitudinal stripes. Thoracic pleurae and venter of abdomen with abundant black hair. Sublateral pale tergal hair patches absent.

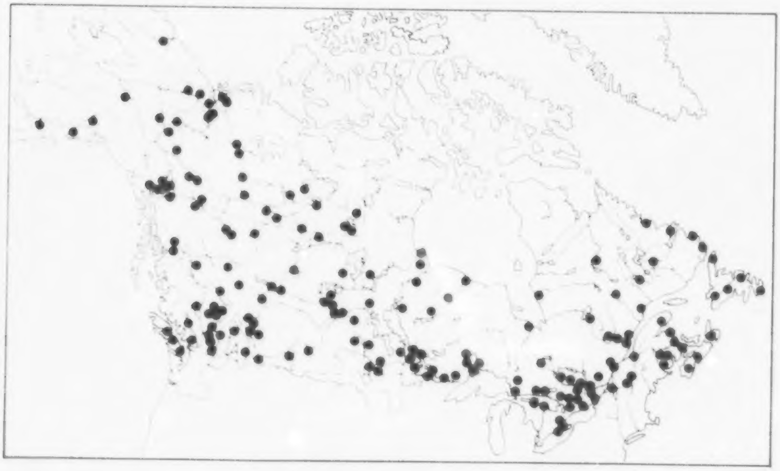
Remarks. This species is distinguished by its relatively large size, orange-sided abdomen with median black stripe, and the dimensions and shape of basal flagellomere, frons, and palpus. It is most similar to *H. aurilimba* Stone, *H. fulvilateralis* Macquart, and *H. arpadi* Szilady.



Figs. 13–15. Head features of *Hybomitra affinis* (13), *H. agora* (14), and *H. arpadi* (15).

It is among the most abundant and widely distributed species of Tabanidae in Canada and is an important pest throughout its dominantly woodland habitat.

Larvae have been found in saturated moss or other predominantly organic materials around swampy woodland pools, marshy lakeshores, willow swamps, and sphagnum bogs (Teskey 1969).



Map 38. Collection localities of *Hybomitra affinis*.

Distribution. The extensive transcontinental range of this species in Canada and Alaska is shown in Map 38, with western populations extending south along the Rocky Mountains to Arizona, whereas in the east the species extends into New York and the New England States. Collection dates extend from 2 June to 20 August, but are predominantly in July.

Hybomitra agora Teskey

Fig. 14, Map 39

Hybomitra agora Teskey, 1988.

Female. Length 15–18 mm. Eye pilose, with 4 greenish transverse stripes on dark background. Frons 3.0–3.5 times as tall as basal width, moderately widened above; ocellar tubercle moderately elevated, with median and lateral oblique shiny denuded streaks; median callus black, elliptical, usually with slender linear extensions toward ocellar tubercle and basal callus; basal callus hemispherical, reddish brown to black, as wide as frons. Subcallus partly denuded and glossy, ventral margin and particularly median extension between antennae and lateral margins raggedly pruinose. Antennal scape and pedicel black or dusky, contrasting with orange base of basal flagellomere; remainder of antenna black. Gena and clypeus white pruinose, dominantly white-haired, with a few black hairs dorsally on gena. Second palpomere 3.0–3.5 times as long as greatest width, white-haired basally and with mixed black and white hairs apically (Fig. 14).

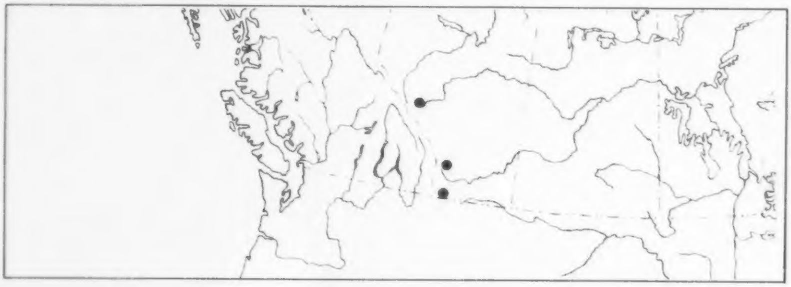
Thorax black; scutum with usual pale pruinose pale-haired longitudinal stripes; notopleural lobe black; pleura dominantly white-haired, with black hair intermixed on anepisternum. Legs with coxae and femora black; tibiae and tarsi orange; apical half of fore tibia and tarsus darkened; all coxae, posterior surface of mid tibia, and all of hind tibia, except post-tibial fringe, white-haired; remainder of legs dominantly black-haired. Costal cell, margins of crossveins, and bifurcation of R_{4+5} faintly pigmented.

Abdominal tergites 1 to 4 or 5 orange brown laterally; first tergite with orange brown coloration reaching metepimeron; tergites with median black area narrowest on tergite 3 and not crossing tergites, posterior margins being narrowly yellow to red; tergal hair dominantly black, but white hairs on posterior borders somewhat expanded into median equilateral and sublateral oblique triangles. Sternites 1 to 3 or 4 orange; remaining sternites black, with yellow hairs on anterior sternites and progressively more black hair on terminal 2 or 3 sternites.

Male. Similar to female except as follows: Basal flagellomere more slender. Second palpomere orange, oval, black-haired apically, white-haired basally. Gena with longer hair, with more of it black. Leg segments dominantly black-haired; coxae with black hair apically. Abdominal tergite 1 sometimes blackened laterally; other tergites lacking sublateral oblique patches of white hair. Sternites black, black-haired, except on posterior margins.

Remarks. This species is most similar to *H. rupestris*. The initial distinction of the two species was a result of the discovery of adjacent male aggregations that displayed quite different behavioral patterns. With this start, collections of both sexes from each group were seen to have the consistent differences described here.

Distribution. This species has been seen from Rocky Mountain localities in Banff (Map 39) to Montana, Idaho, Wyoming, Colorado, and New Mexico. Adult collections have been confined mainly to July.



Map 39. Collection localities of *Hybomitra agora*.

Hybomitra arpadi (Szilady)

Fig. 15; Map 40

Tabanus arpadi Szilady, 1923:7.
Tabanus gracilipalpis Hine, 1923:143.
Tabanus cristatus Curran, 1927:81.
Hybomitra arpadi: Philip, 1965:385.

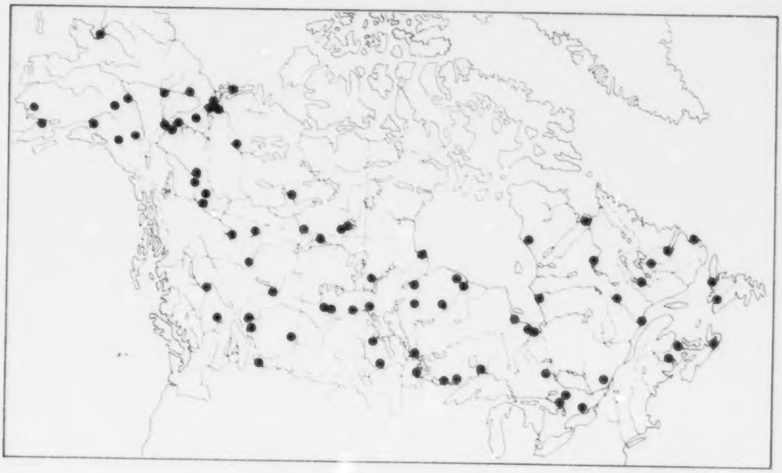
Female. Length 13–16 mm. Eye with short brown pubescence, dark bluish purple, with 4 rather broad transverse green bands. Frons 3.5–4.3 times as long as basal width, moderately widened above; basal and median calli black; ocellar tubercle reddish. Antenna with scape, pedicel, and terminal flagellomeres usually black; basal flagellomere predominantly reddish, with dorsal angle usually acute and having pronounced dorsal excavation. Second palpomere pale yellowish brown, mainly black-haired, relatively slender, and sharply pointed apically, 3.5–4 times as long as greatest width (Fig. 15).

Thorax black; scutum with usual faint longitudinal pale stripes; notopleural lobe usually at least faintly reddish; pleura with normal integument and hair coloring. Legs mainly black; mid and hind tibiae and tarsi usually more or less reddish brown. Halter brown. Wing with costal cell, basal cells or margins of basal veins, and bifurcation of R_{4+5} faintly pigmented.

Abdomen black; tergites 1–3 with sides broadly orange brown and with median black stripe almost parallel-sided; tergites mostly black-haired; lateral and posterolateral margins and median posterior shallow triangles white-haired. Sternite 1 usually predominantly black; sternites 2–4 mostly yellowish-orange; remaining sternites black; sternites with hairs mostly yellow, except more black hairs on posterior 2 or 3 sternites.

Male. Differing from female as follows: Eye with upper ommatidia indistinctly enlarged and 3 greenish transverse bands crowded into lower half; basal flagellomere more slender; abdominal tergites 2–4 with black hair on median black stripe conspicuously erect and brush-like.

Remarks. Before its Holarctic distribution was recognized, this species was referred to in older literature under the name of *H. gracilipalpis* Hine. However, its European name has priority. The species is superficially similar to others in the so-called orange-sided group of species, but the characters given in the key clearly differentiate it if particular attention is paid to the shapes of antenna and second palpomere, as illustrated.



Map 40. Collection localities of *Hybomitra arpadi*.

The only larvae that have been found were in an environment modified by humans (Teskey 1969), but judging by the abundance and broad distribution of the species' natural breeding habitats, it would probably not be very restrictive.

Distribution. The North American range of this species is transcontinental, covering most if not all areas of Canada south of the treeline (Map 40) and extending into the New England States and Minnesota. The Palaearctic distribution is equally extensive, from Scandinavia to the Bering Coast. Adult collection dates extend from mid June to mid August.

Hybomitra astuta (Osten Sacken)

Figs. 16, 176; Map 41

Tabanus astutus Osten Sacken, 1876:471.
Hybomitra astuta: Philip, 1947:292.

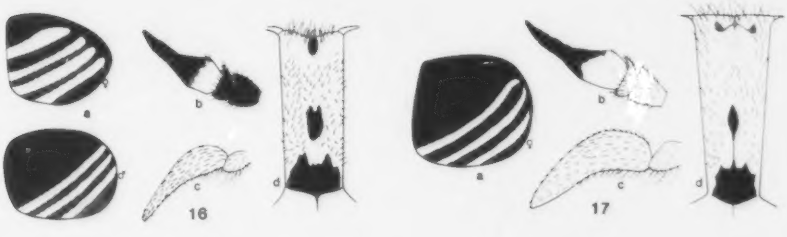
Female. Length 11–15 mm. Eye with short pubescence and 4 narrow transverse bands (Fig. 16*a*). Frons 2.3–3.0 times as long as basal width, usually nearly parallel-sided, distinctly notched at vertex; ocellar tubercle small but prominent, denuded, reddish brown; median callus small, black, suboval; basal callus reddish brown, narrower than frons. Scape and pedicel grayish black; basal flagellomere reddish basally, more or less darkened distally, slender, with little or no dorsal angle or excavation. Second palpal segment light brown, relatively small and slender, 3.5–4.5 times as long as greatest width (Fig. 16).

Thorax with scutal stripes more conspicuous than normal; alternating subglossy black and pruinose; notopleural lobe black. Legs with femora mostly black; tibiae and tarsi dark reddish. Wing clear except for faint tinting of costal cell.

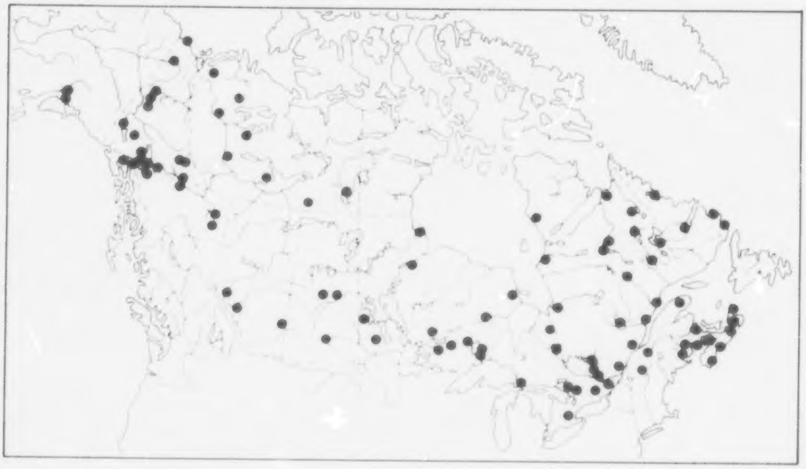
Abdominal tergites black, with grayish white median equilateral triangles and sublateral triangles skewed toward median line, both triangles arising from narrow white posterior borders of tergites (Fig. 176). Hair coloring same as integument where situated. Sternites gray, mainly white-haired, with narrow, pale, posterior margins; sternites 1–4 with some black hair mixed with white medially; remaining sternites completely black-haired.

Male. Similar to female except as follows: more abundant black hair, especially on genae, apex of fore coxae, all femora, and all abdominal sternites; palpus light brown, oval, nearly twice as long as greatest width; eyes dark-haired, with 3 transverse green stripes in lower half (Fig. 16*a*); abdominal tergites with pale hairs essentially confined to posterior margins, with only slight expansions medially; sides of tergites 2 and 3 orange brown.

Remarks. The characteristic subglossy scutal stripes and white abdominal markings of this species are quite distinctive. The female shows a general similarity to such species as *H. hearlei* (Philip), *H. itasca* (Philip), *H. microcephala* (Osten Sacken), and *H. pechumani*



Figs. 16, 17. Head features of *Hybomitra astuta* (16) and *H. atrobasis* (17).



Map 41. Collection localities of *Hybomitra astuta*.

Teskey & Thomas but is most similar to *H. frosti* Pechuman. *Hybomitra frosti* shares to some extent the above characteristics with *H. astuta* but has a more slender second palpomere and a pale brown notopleural lobe.

Distribution: This species has a northern transcontinental distribution (Map 41), with extensions to Minnesota, Michigan, New York, and the New England States. Adult collections have been made from mid June to mid August, with the majority in the latter part of this period.

Hybomitra atrobasis (McDunnough)

Fig. 17; Map 42

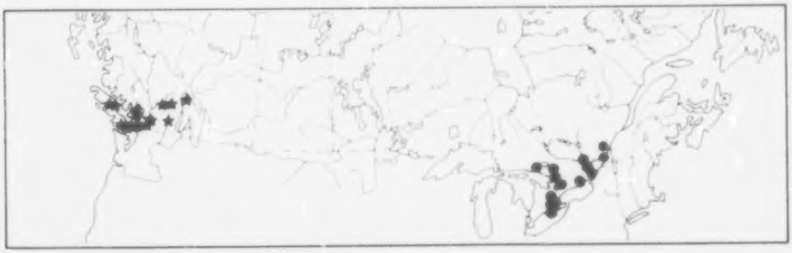
Tabanus atrobasis McDunnough, 1921:144.
Hybomitra atrobasis: Philip, 1947:292.

Female. Length 14–17 mm. Eye with short pubescence and 4 narrow green stripes on dark background. Frons 3.0–3.5 times as long as basal width, widened dorsally; ocellar tubercle usually with small lateral glossy spots; basal callus as wide as high, hemispherical to somewhat angulated above, slightly narrower than frons; median callus small, elliptical, sometimes evanescent. Subcallus pruinose, usually sparsely haired laterally. Scape and pedicel reddish to partly black; basal flagellomere reddish on no more than basal half, with obtuse dorsal angle and no dorsal excavation. Second palpomere light brown, black-haired, 3.0–3.4 times as long as greatest width (Fig. 17).

Thorax, including notopleural lobe, black with faint scutal stripes. Coxae and femora black; tibiae and tarsi reddish to nearly black; hind tibial fringe well developed, black. Costal cell, crossveins, and furcation of R_{4+5} faintly pigmented.

Abdomen mainly black; tergites 2–4 with lateral third and tergite 1 with posterolateral margin dark reddish orange; tergites with posterior margins pale pruinose, yellow-haired, expanding to form shallow median triangles on tergites 2 to 4 or 5 and sublateral oblique triangles on tergite 2; remainder of tergites black-haired. Sternites 1–5 reddish to extensively black, predominantly yellow-haired; remaining sternites black and black-haired.

Male. Differs from female as follows: Eye bluish purple with 3 transverse green bands in lower half (Fig. 17*a*); ommatidia slightly larger in upper portion but not sharply differentiated. Basal flagellomere twice as long as greatest width; posterior margins of abdominal tergites not or only slightly paler, with pale hairs restricted to median and lateral portions of hind margin. Sternites completely black-haired.



Map 42. Collection localities of *Hybomitra atrobasis* (★) and *H. aurilimba* (●).

Remarks. This species is similar to *H. affinis* and *H. arpadi* but differs from them and from most other red-sided forms by the basal flagellomere lacking a sharp dorsal angle, the notopleural lobe black, and the red on sides of the abdomen not extending to the anterior margin of tergite 1. It is most similar to *Hybomitra agora* Teskey, but the key characters and completely black-haired palpus readily differentiate *atrobasis*.

It is one of the most abundant species in Oregon, where it is common around water (Mahmoud 1980).

Distribution. Confined to southern British Columbia (Map 42) and the northwestern United States south to Oregon. Collections have been made from 30 May to 3 September, with most in July and August.

Hybomitra aurilimba (Stone)

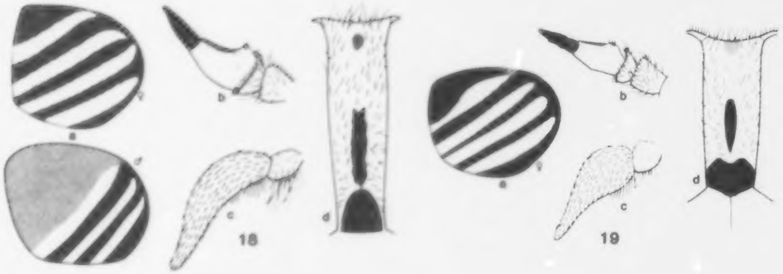
Figs. 18, 193; Map 42

Tabanus aurilimbus Stone, 1938:130.
Hybomitra aurilimba: Philip, 1947:292.

Female. Length 16–18 mm. Eye almost or quite nonpubescent, with 4 greenish blue stripes on dark background (Fig. 18*a*). Frons about 4 times as long as basal width, slightly widened dorsally; ocellar tubercle small and denuded; median callus long oval to elliptical, black; basal callus reddish, higher than wide, narrower than frons and usually broadly connected to median callus. Subcallus pruinose. Antenna with scape and pedicel yellow; basal flagellomere orange, with black restricted to lining the prominent dorsal excavation; dorsal angle nearly 90°; terminal flagellomeres black. Second palpomere brownish yellow, 3.7–4.2 times as long as greatest width (Fig. 18).

Thorax dorsally dark brown to black, with usual longitudinal stripes; notopleural lobe reddish; scutellum, pleural surfaces, and coxae predominantly pale-haired. Legs mainly reddish; basal portion of femora and apex of fore tibia and tarsus with variable blackening; hind tibial fringe black, well developed. Wing with costal cell yellow, some veins with margins faintly pigmented.

Abdomen with first 4 tergites yellowish-orange; scutellum with median dark spot below and sometimes with narrow median row of black spots, narrowest on tergites 3; tergites 5–7 black (Fig. 193); tergal hairs mainly black; posterior margins with yellow hair expanding to form sublateral oblique triangles and median patches. Sternites 1–6 completely orange and yellow-haired; sternite 7 black and black-haired.



Figs. 18, 19. Head features of *Hybomitra aurilimba* (18) and *H. brennani* (19).

Male. Differing from female as follows: Eye densely haired, predominantly dark bluish purple, with 3 transverse greenish bands crowded into lower half (Fig. 18*a*); ommatidia scarcely differentiated in size. Basal flagellomere slightly narrower, but with similar dorsal angulations to female. Second palpomere oval, about twice as long as greatest width. Last 3 abdominal tergites black, contrasting with yellow anterior sternites. Sternites with sharply outlined small median black spots.

Remarks. Adults, as well as larvae (Teskey 1969), show the close relationship of this species to *H. affinis*. Adult females of *H. aurilimba* are differentiated by the narrower median abdominal stripe, slightly narrower basal flagellomere, generally paler appearance, and nearly bare eyes. Males have been observed in Algonquin Park, Ont., patrolling over a rocky roadside stream with a dense forest on the other side.

Larvae were found in wet moss in a shallow drainage ditch in a grassy woodland meadow (Teskey 1969).

Distribution. Restricted to southern Ontario, southern Quebec (Map 42), adjacent New York, northern Pennsylvania, and the New England States. Adults have been collected from mid June to early August.

Hybomitra brennani (Stone)

Fig. 19; Map 43

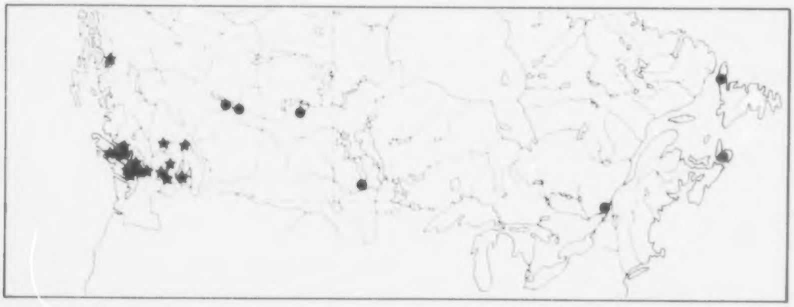
Tabanus brennani Stone, 1938:157.
Hybomitra brennani: Philip, 1947:292.

Female. Length 14–16 mm. Eye bluish black, with 4 transverse greenish bands (Fig. 19*a*). Frons 3.0–3.5 times as long as basal width, slightly widened dorsally; ocellar tubercle denuded, reddish orange; median callus long ovate, black; basal callus usually wider than high, touching eyes. Subcallus pruinose. Antenna with scape and pedicel orange; basal flagellomere mostly orange, 1.5 times as long as greatest width, with obtuse dorsal angle and with only slight excavation; apical flagellomeres darker and slightly shorter than basal flagellomere. Second palpomere swollen, about three times as long as greatest width (Fig. 19).

Thorax dominantly grayish, with usual darker scutal stripes; notopleural lobe reddish. Legs reddish brown, mid and hind coxae and base of femora partly blackened. Wing with costal cell, borders of veins, and furcation of R_{4+5} lightly pigmented.

Abdomen black dorsally; tergites 1–4 with sides diffusely yellowish orange and with overriding median and sublateral spots; spots subtriangular, pale pruinose, white-haired, arising from narrow whitish posterior margins. Sternum mostly dull reddish, blackened anteriorly and posteriorly.

Male: Unknown.



Map 43. Collection localities of *Hybomitra brennani* (●) and *H. californica* (★).

Distribution. *Hybomitra brennani* has a disjunct distribution, having been found in Alberta and Newfoundland (Map 43) as well as New Hampshire and Vermont. Only one or a few specimens are known for any of these localities. Collections extend from late June to mid July.

Hybomitra californica (Marten)

Fig. 20; Map 43

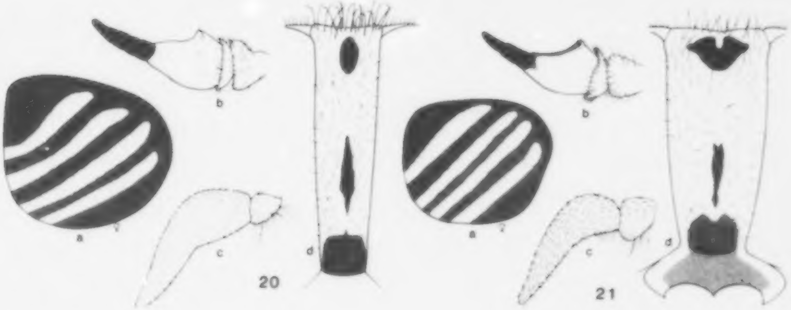
Tabanus californicus Marten, 1882:210.
Hybomitra californica: Philip, 1947:292.

Female. Length 16–20 mm. Eye rather densely brown pubescent, dark bluish purple, with 4 transverse greenish stripes. Frons 4.3–4.8 times as long as basal width, prominently widened above; median callus black, lanceolate; basal callus reddish, narrower than frons. Subcallus pruinose. Antenna with scape and pedicel yellow; basal flagellomere predominantly to completely orange; apex or rim of dorsal excavation black, distinct, no more than 1.2 times as long as greatest width, with dorsal angle nearly 90°; terminal flagellomeres black and nearly as long as basal flagellomere. Second palpomere creamy white, swollen, 2.9–3.3 times as long as greatest width (Fig. 20).

Thorax predominantly blackish; scutum with usual longitudinal stripes; notopleural lobe reddish brown. Pleura and coxae mainly creamy, white-haired; anepisternum with black hair. Femora and apical half of fore tibia black; base of fore tibia and mid and hind tibiae yellowish orange, with mainly concolorous hair including post-tibial fringe. Wing with costal cell lightly pigmented.

Abdomen broadly reddish brown laterally on first 4 tergites, with narrow median posteriorly tapered black stripes; tergites mainly black-haired; posterior and lateral margins of tergites with bands of yellow hair, expanding anteriorly into shallow median and larger sublateral oblique triangles. Sternites 1–4 largely yellowish orange; sternites 5–7 black; all sternites with paler posterior margins and almost completely yellow-haired.

Male. Differing from female as follows: Ommatidia on dorsal two-thirds of eye more than twice the size of ventral ommatidia, with distinct line of demarcation between them. Antenna smaller; basal flagellomere narrower and with shallower dorsal excavation. Second palpomere suboval, about twice as long as greatest width. Fore tibia and hind tibial fringe almost completely black; abdomen ventrally black; sternite 1 and median area of sternite 2 black; all sternites with black hair medially.



Figs. 20, 21. Head features of *Hybomitra californica* (20) and *H. captonis* (21).

Remarks. Females are distinctive in being among the largest of *Hybomitra* and having reddish brown sides to the abdomen, strongly tapered frons, broad orange basal flagellomere, and orange post-tibial fringe of hairs. Although not seen in Canadian specimens, there are in more southern populations some specimens of otherwise undoubted *H. californica* with a black post-tibial fringe. The significance of this is not yet known.

Females are more commonly collected at higher elevations, and larvae were found in organic soil or moss on the margins of small, shaded temporary woodland pools. They are very difficult to rear in the laboratory (Lane 1979).

Distribution. Restricted to southern British Columbia in Canada (Map 43) but extending south to mid California. Collection dates are predominantly in late July to August.

Hybomitra captonis (Marten)

Fig. 21; Map 44

Tabanus captonis Marten, 1882:211.
Tabanus comastes Williston, 1887:137.
Hybomitra captonis: Philip, 1947:293.

Female. Length 14–18 mm. Eye dark bluish purple, with 4 transverse greenish stripes and with dense short pubescence. Frons 3–4 times as long as basal width, strongly widened above; vertex with reddish brown subtriangular denuded area surrounding vestigial ocelli; median callus of variable sublanceolate shape; basal callus reddish brown, much narrower than frons, and continuous with large central concolorous denuded area on subcallus. Antenna with scape and pedicel pale pruinose, usually more or less reddish; basal flagellomere reddish, at most darkened at apex or in dorsal excavation, about 1.2 times as long as greatest width, with distinct dorsal angle and excavation. Second palpomere moderately swollen, 3.1–3.6 times as long as greatest diameter, creamy white, predominantly black-haired (Fig. 21).

Thorax black dorsally, with only faint suggestion of paler stripes; notopleural lobe reddish. Legs with femora and fore tibia predominantly black; mid and hind tibiae and tarsi reddish; hind tibial fringe black. Wing with costal cell lightly pigmented.

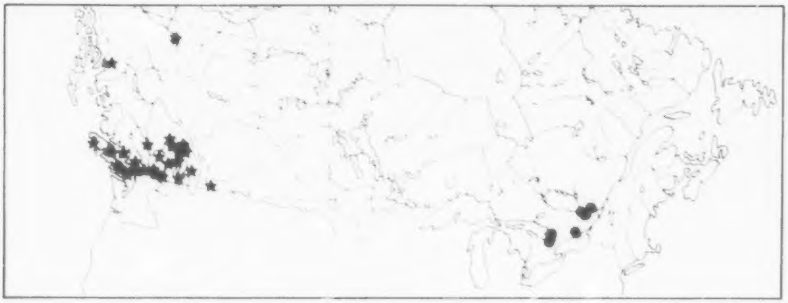
Abdomen with integument of tergites 1–4 broadly orange brown laterally, with median black stripe tapered to tergite 3 but slightly widened on tergite 4; tergite 5 black, with small sublateral orange spots; tergites 6–7 black. Tergal hair color dominantly black except yellow hair on lateral third of tergite 1 and narrow lateral and posterior borders of remaining tergites and mixed with yellow hair laterally on tergite 2. Sternites 1, 6, and 7 and median spot on sternite 2 black; remaining sternites yellowish red and mainly yellow-haired; sternites 6 and 7 with some black hair.

Male. Differs from female as follows: Eye with three transverse greenish black bands in lower half; upper enlarged ommatidia more than twice the size of smaller lower ommatidia, the two areas rather distinctly differentiated. Basal flagellomere slightly narrower; subcallus pruinose. Second palpomere ovate, brown, nearly twice as long as greatest width, completely covered with long black hair; abdominal tergites 1 and 2 with gena, legs, and sides predominantly black-haired. All sternites with black hair medially.

Remarks. This species is among the more common ones in southern British Columbia and the Pacific Northwest states and should pose no difficulty in identification. Like *H. californica* (Marten), it seems to be more abundant at higher elevations.

Larvae have been found in organic soils in a variety of natural or artificial wetland habitats (Teskey 1984).

Distribution. Southern British Columbia and southwestern Alberta (Map 44) to California. The flight period extends from late June to early September.



Map 44. Collection localities of *Hybomitra captonis* (★) and *H. cincta* (●).

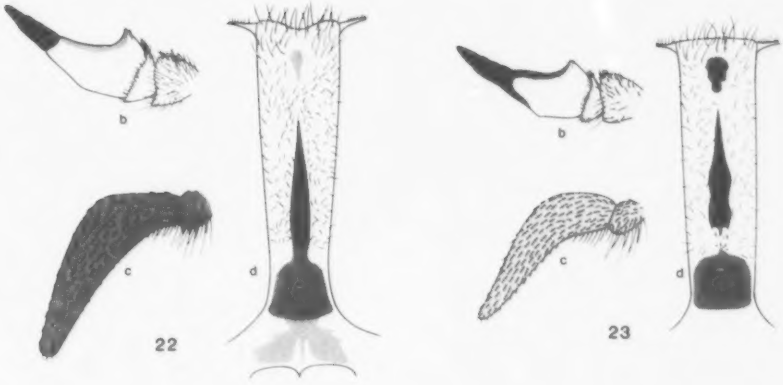
Hybomitra cincta (Fabricius)

Fig. 22; Map 44

Tabanus cinctus Fabricius, 1794:366.
Hybomitra cincta: Philip, 1947:293.

Female. Length 19–22 mm. Eye bare or sparsely micropubescent, with 4 greenish blue transverse bands on a dark purplish background. Frons four times as tall as basal width, slightly widened above; ocellar rudiments denuded, but not elevated on distinct tubercle; median callus elongate, black, tapered dorsally, usually fused with reddish basal callus; basal callus not reaching eye margins. Subcallus partly denuded. Clypeus and genae brown pruinose. Antenna with scape and pedicel yellowish; basal flagellomere reddish, with apex or margin of dorsal excavation (or both) darkened, about 1.5 times as long as basal width, with dorsal angle about 90° and excavation pronounced; apical flagellomeres black. Second palpomere black, about four times as long as greatest width (Fig. 22).

Thorax black and black-haired; scutal stripes absent. Legs black. Wings smokey with costal cell and margins of veins pigmented.



Figs. 22, 23. Head features of *Hybomitra cincta* (22) and *H. criddlei* (23).

Abdomen with first 3 tergites distinctively bright yellow; median black triangle below scutellum tapering to a point near middle of second tergite; narrow ventrally reflexed lateral margins black; remaining tergites black. Sternites similarly colored except predominantly yellow sternite 4. Abdominal hairs concolorous with integument where situated.

Male. Similar to female, especially in distinctive body coloration, but eye densely short pubescent.

Remarks. This and its sister species, *H. criddlei* (Brooks), are among the most colorful and distinctive of the genus, with the predominantly yellow anterior 3 tergites sharply contrasting with the black posterior tergites. The similarity is also evident in their larvae. The one larva that has been collected and raised was found in wet organic soil on the banks of a stream flowing through a swampy woodland meadow (Teskey and Burger 1976).

Distribution. In Canada the species is apparently confined to southern and eastern Ontario and adjacent parts of Quebec (Map 44), which constitute the northern limits of a range extending to the Gulf of Mexico in Louisiana and northern Florida. Adults have been collected in Canada from mid June to July.

Hybomitra criddlei (Brooks)

Figs. 23, 196; Map 45

Tabanus criddlei Brooks, 1946:234.
Hybomitra criddlei: Philip, 1947:293.

Female. Length 15–19 mm. Eye bare to sparsely pubescent, with 4 greenish blue transverse bands on dark purplish background. Frons grayish pruinose with brownish tinge, black-haired, about four times as tall as basal width, slightly widened above; ocellar tubercle low, with only vestigial ocelli denuded; median callus black, long lanceolate, narrowly connected to basal callus; basal callus subquadrate, reddish brown, slightly narrower than frons. Clypeus and gena with black and yellowish hair, concolorous with frons. Scape and pedicel orange pruinose; basal flagellomere orange with black at apex or on lining of dorsal excavation (or both), with dorsal angle 90° and excavation prominent. Second palpal segment brown with black hair, about four times as long as greatest width.

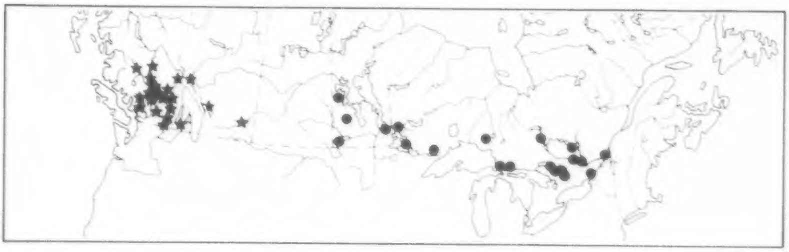
Thorax predominantly brownish black, with black and relatively sparse white hair. Legs predominently brownish black; mid and hind tarsi reddish. Wing with costal cell and margins of veins pigmented.

Abdomen with most of tergites 1–3 and sternites 2–4 clear yellow; remainder of abdomen black, including a posteriorly tapering median line of black spots and lateral margins on tergites 1–3. (Fig. 196). Hair concolorous with integument where situated.

Male. Similar to female except as follows: Palpus dark brown, oval, nearly twice as long as broad; sternite 4 often extensively black.

Remarks. This species and *H. cincta* are similar and are among the most distinctive in the family by virtue of their coloration. The two species differ in several ways.

	H. cincta	*H. criddlei*
Subcallus	partly denuded	pruinose
Frons, clypeus, and genae	brown	gray, brown-tinged
Palpus	black	yellow brown
Thorax	blacker with black hairs	brownish black with some white hairs
Wing	entirely smoky	clear except on vein margins
Sternite 1	yellow	black
Tergite 3	no median black spot	median black spot



Map 45. Collection localities of *Hybomitra criddlei* (●) and *H. enigmatica* (★).

Larvae have been found in fine gravel in the bed of a forest stream (Teskey 1969).

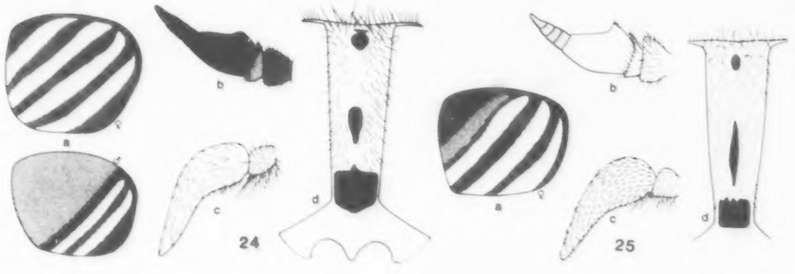
Distribution. Collection localities follow closely the southern border of the Laurentian Shield, with a small westward extension into southwestern Manitoba (Map 45). Adult collections have been made from early June to the end of July.

Hybomitra enigmatica Teskey

Fig. 24; Map 45

Hybomitra enigmatica Teskey, 1982:1077.

Female. Length 12–16 mm. Eye sparsely short pilose, dark bluish purple, with 4 green bands (Fig. 24*a*). Frons 3.5–4.2 times as tall as basal width, widened above; ocellar tubercle small, denuded; median callus black, sometimes narrowly connected to basal callus; basal callus subquadrate, light brown to black. Subcallus pruinose. Antenna mostly black; basal flagellomere more or less orange basally, slender with obtuse dorsal angle and only slight dorsal excavation. Second palpomere creamy white, mainly yellow-haired, 2.5–3.0 times as long as greatest width (Fig. 24).



Figs. 24, 25. Head features of *Hybomitra enigmatica* (24) and *H. epistates* (25).

Thorax black, with faint scutal stripes. Notopleural lobe orange brown. Coxae, femora, and apical portion of fore tibia and fore tarsus black; remainder of legs orange brown. Wing lightly pigmented in costal cell and on bifurcation of R_{4+5}, where short spur vein is sometimes present.

Abdomen orange brown on sides of tergites 2 to 3 or 4 and on posterolateral margin of tergite 1; abdomen with median black stripe usually tapered to tergite 3 but with edges indented in each tergite; tergites with yellow hairs on lateral and posterior margins expanding to median triangles and sublateral oblique patches; remaining tergites black-haired. Sternites 1 and 5–7 dominantly black; sternites 2–4 mostly orange, mostly yellow-haired, and sometimes with median black spot.

Male. Similar to female except as follows: Eye more densely pilose, with faint size demarcation between upper and lower ommatidia, colored dominantly purple with 2 green bands in ventral third (Fig. 24*a*); abdomen dorsally with median black stripe one-third width of abdomen. Sternites more extensively black; outer fore tarsal claw slightly longer than inner claw.

Remarks. Before this species was described, it was confused with *Hybomitra sonomensis* (Osten Sacken) and *H. phaenops* (Osten Sacken). *Hybomitra phaenops*, a more southern species reaching only to the middle of Washington and Idaho, differs from *H. enigmatica* from *H. sonomensis* essentially only in eye color pattern, having 3 narrow, dark bluish to purple transverse stripes on a bright green background. In the other two species the 3 stripes are broader, and the upper and lower margins of the eye are purplish blue. The key characters will readily differentiate *H. enigmatica* from *H. sonomensis*.

Distribution. Southern British Columbia and southwestern Alberta (Map 45), south to Idaho, Wyoming, and northern California. The flight period extends from late June to about the end of August, with most collections in late July.

Hybomitra epistates Osten Sacken

Fig. 25; Map 46

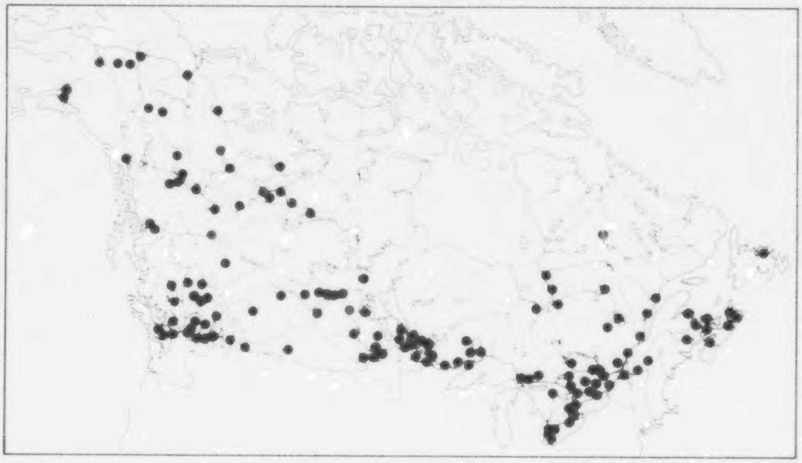
Tabanus epistates Osten Sacken, 1878:555.
Tabanus socius Osten Sacken, 1876:467 (preocc. Walker, 1848).
Hybomitra epistates: Philip, 1947:293.

Female. Length 12–16 mm. Eye densely pilose, with 4 transverse green stripes on dark background, the upper stripe faint (Fig. 25*a*). Frons 4.5–5 times as tall as basal width, nearly 1.5 times as wide dorsally as at base; ocellar tubercle small, oval, reddish; median callus black, linear; basal callus black to reddish brown, subquadrate. Subcallus pruinose. Antenna with scape and pedicel yellowish gray pruinose; basal flagellomere usually bright orange, occasionally darkened apically or in dorsal excavation, about 1.3 times as long as greatest width, with dorsal angle slightly acute and a moderate dorsal excavation; apical flagellomeres darker than basal flagellomere. Second palpomere creamy white, distinctly swollen basally, 2.5–3 times as long as greatest width (Fig. 25).

Thorax grayish black; scutum with faint longitudinal stripes; notopleural lobe reddish. Coxae, femora, apex of fore tibia and fore tarsus black; remaining tibiae and tarsi reddish. Postcoxal fringe black. Costal cell and margins of longitudinal veins faintly pigmented.

Abdomen with sides of tergites 1 to 4 or 5 orange brown; tergites 1–4 with median black stripe tapering to tergite 3; tergites dominantly black-haired, with yellow hair restricted to lateral and posterolateral margins and to median posterior triangles; tergites 2 and 3 with sublateral anterior extensions of yellow hair. Sternites 1 to 4 or 5 mainly orange brown; sternites 1–4 with median black spot; sternal hair mainly yellow; sternites 5–7 with progressively more black hairs.

Male. Differing from female as follows: Eye with usual 3 greenish transverse bands in lower half; ommatidia in upper half about 1.3 times as large as in lower half; transverse bands and ommatidia not distinctly differentiated. Antenna more slender; terminal flagellomeres often yellowish. Second palpomere broad, oval, often slightly more expanded apically, about 1.5 times as long as greatest width, with both white and black hair.



Map 46. Collection localities of *Hybomitra epistates*.

Remarks. Females of this common species are readily differentiated from other species having reddish-sided abdomens by their strongly narrowed frons, swollen palps, and completely orange basal flagellomere.

Larvae commonly have been found in wet moss in rather open woodland marshes and swamps (Teskey 1969).

Distribution. This species has been collected transcontinentally from southern Alaska and British Columbia to Newfoundland (Map 46). It extends south into Washington and Oregon, along the Rocky Mountains to Colorado, and east into states bordering the Great Lakes. The flight period extends from early June to the first part of August, peaking in early July.

Hybomitra frontalis (Walker)

Fig. 26; Map 47

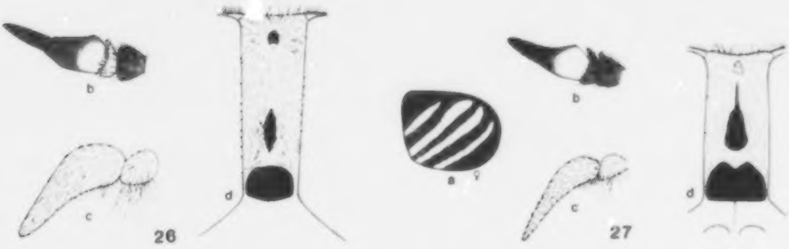
Tabanus frontalis Walker, 1848:172.
Tabanus incisus Walker, 1850:26.
Tabanus septentrionalis Loew, 1858:592.
Tylostypia labradorensis Enderlein, 1925*a*:363.
Tabanus canadensis Curran, 1927:82.
Hybomitra frontalis: Philip, 1965:339.

Female. Length 10–16 mm. Eye short pubescent, with 4 greenish blue bands on dark background. Frons 3.0–3.8 times as tall as basal width, parallel-sided to 1.3 times as wide above as below; ocellar tubercle with restricted brown denuded patch; median callus usually black, lenticular; basal callus brown to black, slightly narrower than frons. Subcallus pruinose. Clypeus and gena usually with some black hair. Scape and pedicel orange-brown to black; basal flagellomere usually partly orange brown, relatively slender, with obtuse dorsal angle and little or no excavation dorsally. Second palpomere creamy white, moderately swollen at 2.8–3.2 times as long as greatest width, with mixed black and pale hair or with black hair absent dorsobasally (Fig. 26).

Thorax black; scutum with faint longitudinal paler stripes; notopleural lobe orange to black. Coxae and femora black; tibiae and tarsi more or less reddish brown. Furcation of R_{4+5} sometimes with spur vein.

Abdominal tergites dominantly black and black-haired; lateral and posterior margins narrow, gray pruinose; sublateral patches gray pruinose to orange, oval to round, bearing white hairs; marginal white hairs medially accentuated. Sternites with all gradations of orange and black coloration, predominantly white-haired anteriorly, with black hair increasing on posterior 2 or 3 sternites.

Male. Differs from female as follows: Eye densely haired; upper ommatidia about 1.8 times as large as lower ommatidia, but with indistinct line of separation; lower area of smaller ommatidia with 2 green bands on dark background; upper area of larger ommatidia darker. Abdomen dominantly black-haired; tergites 1 to 3 or 4 with lateral third reddish, the median band of black usually slightly widened posteriorly. Sternites 1 and 2 black medially; sternites 3 and often 4 orange; remaining sternites black; all sternites mainly black-haired, with fringe of yellow hair on posterior margins.



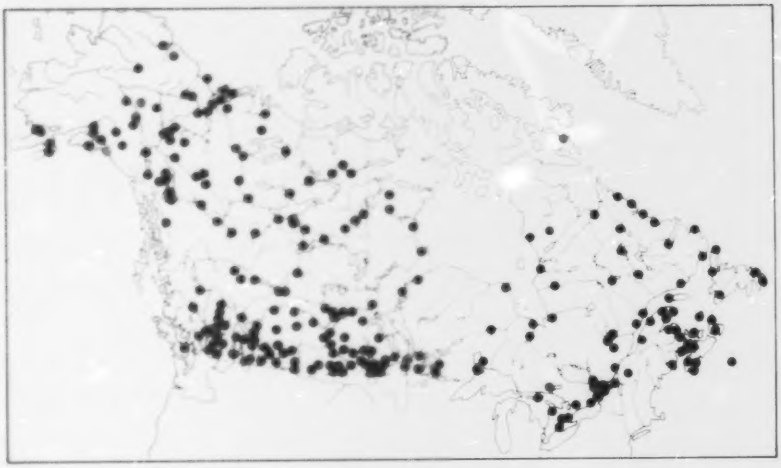
Figs. 26, 27. Head features of *Hybomitra frontalis* (26) and *H. frosti* (27).

Remarks. *Hybomitra frontalis* is traditionally found near the end of keys. This is in part due to the absence of any very distinctive extremes in character states. But also the species is tinctorially quite variable over its extensive range, tending to be more darkly colored in more northern areas, with increased reddish brown coloration farther south. McAlpine (1961), in a detailed study of the significance of this variation, concluded that the variation was intraspecific except for a rather more distinctive population in the western prairie region representing a new species that he named *H. pediontis*.

Hybomitra frontalis is the dominant horse fly throughout much of the northern boreal zone of Canada and Alaska and is a major pest of humans and animals in these northern regions. It is much less frequently encountered in the southern parts of its range.

Larvae have been most commonly collected in wet moss in wetlands overgrown with grasses and sedges and with interspersed shrubs (Teskey 1979).

Distribution. The species is present throughout Canada and Alaska except for the treeless northern tundra regions; even there it is found along rivers harboring dwarf trees and shrubs (Map 47). In the United States *H. frontalis* extends its range down the Rocky Mountains to Colorado. In the east it is present from the Dakotas to Michigan and from New York to Maine. It has been collected in Canada from late May to September, generally earlier in southern populations; the later dates are from farther north.



Map 47. Collection localities of *Hybomitra frontalis*.

Hybomitra frosti Pechuman

Fig. 27; Map 48

Hybomitra frosti Pechuman, 1960:794.

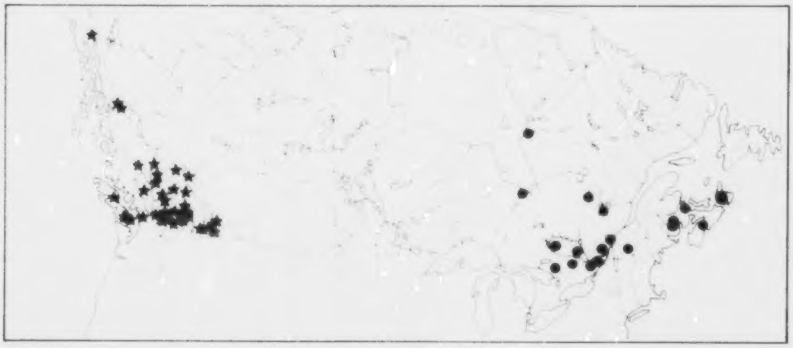
Female. Length 10–15 mm. Eye sparsely short pubescent, purple to black, with 4 narrow greenish blue transverse bands (Fig 27*a*). Frons 2.5–3.0 times as long as basal width, parallel-sided or slightly narrowed above; ocellar tubercle small, normally with only vestigial ocelli being partly glossy; median callus black, oval to lanceolate or club-shaped; basal callus brown, nearly as wide as frons, subquadrate or rounded above, with a slightly more prominent median ventral protuberance. Subcallus pruinose. Scape and pedicel black to partly reddish; basal flagellomere extensively reddish, darkened apically, about 1.5 times as long as greatest width, with obtuse dorsal angle and shallow dorsal excision, if present; terminal flagellomeres black. Second palpomere brownish yellow, four to five times as long as greatest width, with black hair.

Scutum with median and sublateral subglossy stripes; scutum with sides brownish, including notopleural and postpronotal lobes; pleura mostly grayish black; mesanepisternum brownish. Legs extensively reddish orange to black on basal half of femora and tibiae.

Abdomen with pale and dark areas and concolorous hairs; tergites black, with reddish brown overtone laterally, and with median and sublateral whitish triangles arising from narrow pale posterior margins; median triangles equilateral; sublateral triangles skewed medially. Sternites grayish to pale reddish with mostly pale hairs.

Male. Differing from female as follows: Eyes densely pubescent, with upper ommatidia only slightly enlarged. Antenna more slender. Second palpomere short, oval to slightly club-shaped, blackish basally, paler apically. Scutum black, lacking longitudinal stripes. Abdomen entirely black to faintly reddish sublaterally, in latter case with sublateral whitish triangles indistinct; median pale areas linear to short triangular. Sternites 1–4 black to extensively orange, with black hairs extensive or restricted medially.

Remarks. The female of this species is most similar to that of *H. astuta* (Osten Sacken), based on the sharply defined abdominal pattern and rather prominent scutal stripes, but it is readily differentiated by the color of the notopleural lobes and femora. *Hybomitra pechumani* Teskey & Thomas, *H. hearlei* (Philip), and *H. itasca* Philip also show some resemblance to *H. frosti*, but the thoracic and abdominal pattern is less distinct, among other differentiating features outlined in the key.



Map 48. Collection localities of *Hybomitra frosti* (●) and *H. fulvilateralis* (★).

One larva was found in a sphagnum bog (Teskey 1969), and as Pechuman (1981*b*) points out, long series of adults of this species have been collected in such bogs; the species is probably restricted to breeding in sphagnum bogs.

Distribution. *Hybomitra frosti* has been found in Poste de la Baleine on Hudson Bay, south and east to Cape Breton (Map 48), and then throughout the northern New England States and New York to Pennsylvania. Adult collections have been confined to July and August.

Hybomitra fulvilateralis (Macquart)

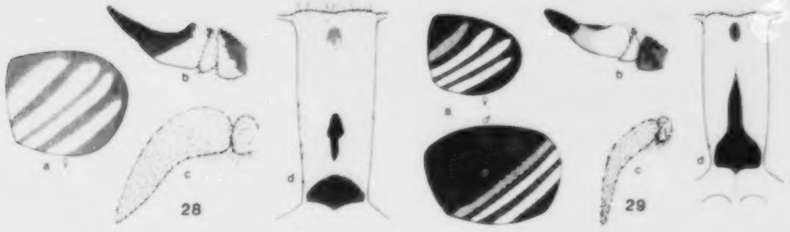
Fig. 28; Map 48

Tabanus fulvilateralis Macquart, 1838:137.
Tabanus recedens Walker, 1854:201.
Tabanus haemaphorus Marten, 1882:210.
Hybomitra fulvilateralis: Philip, 1965:339.

Female. Length 14–18 mm. Eye densely pubescent, bluish black to purple, with 4 rather broad greenish blue transverse bands (Fig. 28*a*). Frons 3.0–3.5 times as tall as basal width, moderately widened above; ocellar tubercle small; median callus oval to linear, black, sometimes narrowly connected to basal callus; basal callus reddish brown, rounded above, narrower than frons. Subcallus pruinose. Scape and pedicel orange or partly black; basal flagellomere more or less black apically, bordering shallow dorsal excavation with dorsal angle about 90°; apical flagellomeres black. Second palpomere creamy white, swollen basally, about three times as long as greatest diameter (Fig. 28).

Thorax dominantly black, with faint scutal stripes; notopleural lobe orange. Legs mainly black; base of fore tibia, apical half of all femora and tibiae, and tarsi of mid and hind legs reddish. Costal cell and borders of crossveins and bifurcation of R_{4+5} pigmented.

Abdomen broadly orange brown laterally on tergites 1–4, with median black band tapering to tergite 3; tergites 1 and 2 with orange sides and with orange hair dominant; remainder of abdomen mostly black-haired; tergites with hind margins having median patches of yellow hair, the largest and subtriangular patches occurring on tergite 2. Sternites 1 and 2 medially blackened; sternites 3 and 4 orange brown; sternites 5–7 black; all sternites (except sternites 5–7) mostly yellow-haired.



Figs. 28, 29. Head features of *Hybomitra fulvilateralis* (28) and *H. hearlei* (29).

Male. Differing from female as follows: Eye with 3 greenish transverse bands in lower half; ommatidia slightly larger above than below. Antenna more slender. Second palpomere oval, about 1.5 times as long as diameter. Tergites with yellow hair on sides, the hair restricted to posterior margins, with only slight expansion sublaterally. Sternites 1 and 2 with median black areas bearing black hair; remaining sternites with black hair present medially.

Remarks. *Hybomitra fulvilateralis* is most similar to *H. affinis* (Kirby) but can be readily differentiated from it by the key characters. In cases of doubt the presence of dominant yellow hairs on the orange sides of the second abdominal tergite is a useful subsidiary feature of *H. fulvilateralis*.

Hybomitra fulvilateralis is a common species in British Columbia both in adult and larval collections. The latter have been found in wet moss or poorly decomposed organic materials among emergent vegetation and on fallen trees in shallow ponds and lake margins (Teskey 1985).

Adults are active from late May to early August.

Distribution. This species reaches its northern limits in British Columbia and montane areas of Alberta (Map 48) and extends south to California, Arizona, and Colorado. Adult collections have been made from 2 June to 14 August.

Hybomitra hearlei (Philip)

Fig. 29; Map 49

Tabanus hearlei Philip, 1936*b*:150.
Hybomitra hearlei: Philip, 1947:294.

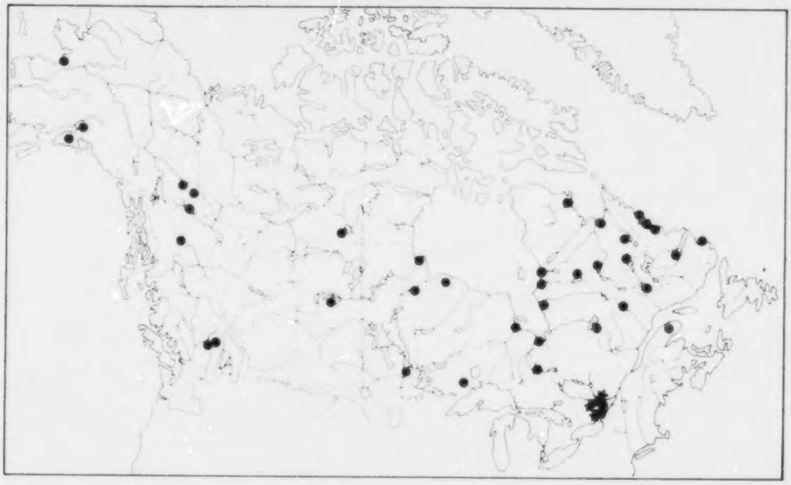
Female. Length 10–12 mm. Eye with short white pubescence and 4 narrow greenish blue transverse bands on a dark background; upper band not distinctly outlined above but gradually blending into dark dorsal margin (Fig. 29*a*). Frons gray pruinose, relatively broad, 2.3–2.9 times as tall as basal width, slightly widened above; ocellar tubercle small, oval, reddish; median callus usually more or less broadly joined to basal callus, the two tapered dorsally; basal callus slightly narrower than frons. Subcallus pruinose. Scape and pedicel predominantly black and black-haired; basal flagellomere about 1.5 times as long as greatest width, reddish basally, with apex and dorsal excavation darkened; dorsal excavation very shallow, with dorsal angle about 90°; apical flagellomeres black. Second palpomere yellowish to light brown, black-haired, slender, 4–5 times as long as greatest width. Proboscis relatively long, about twice as long as second palpomere (Fig. 29).

Thorax grayish black, pruinose; scutum with usual faint longitudinal stripes; notopleural lobe black. Legs predominantly black; mid and hind tibiae and tarsi with reddish tinge. Costal cell and margins of crossveins lightly pigmented.

Abdominal tergites black; tergites 2, 3, and sometimes 4 with posterior margins and median and sublateral triangles grayish pruinose with white hair; remaining tergites black-haired. Sternites black, mainly white-haired, with posterior margins narrowly pale.

Male. Similar to female except as follows: Darker, with longer and more abundant black hairs. Eye with 3 transverse greenish stripes in lower half (Fig. 29*a*); ommatidia moderately larger above and blending gradually to small ommatidia below. Second palpomeres reddish brown, conic-oval, two–three times as long as greatest width. Proboscis elongate, three-quarters as wide as the head. Abdomen with small reddish sublateral areas on tergites 2 and 3; median and sublateral pale-haired areas nearly obsolete. Sternites predominantly black-haired, with only pale posterior borders white-haired.

Remarks. *Hybomitra hearlei* is most similar to *H. pechumani* Teskey and Thomas but is readily differentiated from it by the black notopleural lobes. This feature and the slender palps, longer proboscis, and contiguous basal and median calli identify the species. The male of *H. hearlei* is reported here for the first time; the



Map 49. Collection localities of *Hybomitra hearlei* (●) and *H. hinei* (★).

specimens were collected in northern Quebec together with females. The two sexes are readily associated, based on similar coloring and body patterns.

Distribution. This species has a mainly northern distribution, from Alaska to Labrador (Map 49). Its flight period extends from the last week of June to the first week of August.

Hybomitra hinei (Johnson)

Fig. 30; Map 49

Tabanus hinei Johnson, 1904:15.
Therioplectes politus Johnson, 1900:325.
Hybomitra hinei: Philip, 1947:294.

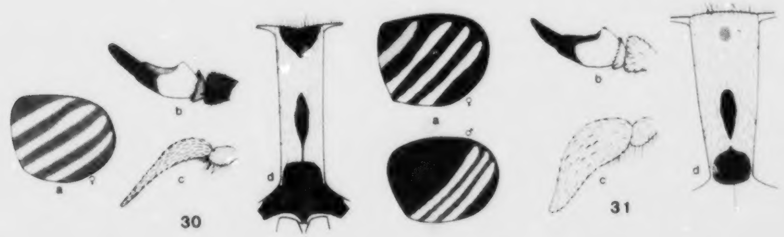
Female. Length 11–12 mm. Eye weakly short pubescent, with 4 greenish blue transverse bands on a dark reddish purple background, the alternating bands of nearly equal width (Fig. 31*a*). Frons 3.5–4 times as tall as basal width, slightly widened above; ocellar tubercle small, situated in lower corner of a reddish denuded area extending to vertex. Basal callus subquadrate, nearly as wide as frons. Subcallus and upper portions of clypeus and gena denuded, reddish brown. Antennae nearly completely black to extensively yellow or orange on scape, pedicel, and much of basal flagellomere; basal flagellomere rather slender, with obtuse dorsal angle and little if any excision. Second palpomere dark brown, slender with acute tip, five times as long as greatest width (Fig. 31).

Thorax, especially scutum and scutellum, glossy black with reddish tinge; notopleural lobe usually yellow, sometimes dark; scutum with faint narrow median and sublateral grayish longitudinal stripes. Legs predominantly brownish black; basal half of tibiae reddish to yellow. Wing with costal cell and entire apex beyond basal cells with brownish tinge, darkest near stigma.

Abdomen black; tergites 1 to 3, 4, or 5 with sides bearing progressively smaller reddish yellow spots; tergites with posterior margins narrowly yellow with yellow hairs. Sternites mostly yellow to extensively blackened; sternite 1, median anterior spot on sternite 2, and sternites 6 and 7 always black; sternites 2–7 with posterior margins yellowish.

Male. Similar to female except as follows: Upper eye facets larger but not sharply demarcated from smaller lower facets. Antenna more slender. Palpus nearly black, short, cylindrical. Body integument glossier and blacker. Median abdominal black stripe tapering to tergite 3, where stripe less than one-third width of abdomen and sublateral reddish yellow patches correspondingly larger.

Remarks. This species is quite distinctive and unlikely to be confused with any others. Pechuman (1981) mentions finding adults in sphagnum bogs in New York, which apparently is also the case with the Ontario specimens.



Figs. 30, 31. Head features of *Hybomitra hinei* (30) and *H. illota* (31).

Larvae were found in wet moss of an abandoned cranberry bog in New Jersey (Teskey 1969).

Distribution. This is an eastern species, reaching its northern limits in eastern Ontario (Map 49). Philip (1947) first recorded the species in Ontario without further information. Pechuman et al. (1983) showed that this was one of several inland populations apparently separated from the main distributional centre on the east coast of the United States. The Canadian specimens were collected from mid June to the latter part of July.

Hybomitra illota (Osten Sacken)

Figs. 31, 172; Map 50

Tabanus illotus Osten Sacken, 1876:469.
Hybomitra illota: Philip, 1947:294.

Female. Length 11–14 mm. Eyes densely short pilose, with 4 greenish blue transverse bands on a dark purplish background (Fig. 31*a*). Frons brown pruinose with black hair, 3.0–3.5 times as long as basal width, distinctly widened above; ocellar tubercle small; basal callus subquadrate, narrower than frons. Subcallus, clypeus, and gena gray pruinose; gena mainly white-haired, with some black hair on upper portion. Antenna with scape and pedicel black to reddish pruinose; scape and pedicel with black and white hair; basal flagellomere about 1.3 times as long as greatest width, blackened apically, with dorsal angle usually slightly obtuse and dorsal excavation shallow; apical flagellomeres black, usually slightly shorter than width of basal flagellomere. Second palpomere creamy white, 2.5–3 times as long as greatest width, with black and white hair, except black hair absent basally (Fig. 31).

Thorax mainly black; notopleural lobes reddish; scutum mostly black-haired, with faint longitudinal stripes; pleura gray pruinose, mostly white-haired. Legs with coxae and femora blackish; tibiae and tarsi reddish to black; hind tibial fringe black. Wing clear except for brownish spots on crossveins and bifurcation of R_{4+5}.

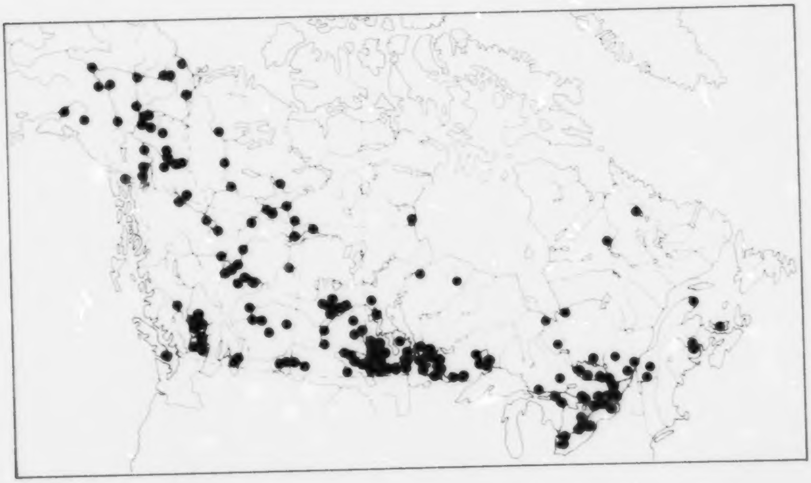
Abdomen mainly black dorsally; tergites with posterior margins black-haired submedially, narrowly whitish pruinose; tergites 2 to 3 or 4 with yellowish white to orange sublateral oval patches and faint whitish median triangles (Fig. 172); tergal hairs usually concolorous with integument where situated; tergites 1 and 2 white-haired on black lateral borders. Sternite 1 and median anterior area of sternite 2 always black; remaining segments more or less yellowish or black, with posterior margins narrowly paler.

Male. Differing from female as follows: Eye with dense black pubescence; upper median ommatidia slightly larger than ventral ommatidia but two areas not sharply differentiated. Antenna more slender. Second palpomere oval to slightly more swollen apically. Scutum subshiny, lacking paler stripes. Abdominal tergites diffusely reddish orange laterally, with lateral margins lacking white hair.

Remarks. *Hybomitra illota* is among the most common species in Canada and is an aggressive blood feeder on humans and livestock.

Larvae have been commonly found in bog-like conditions of woodland swamps, in moss, or in poorly decayed organic materials often associated with decaying trees.

Distribution. The species has been collected from Alaska to Newfoundland (Map 50) and in all of the northern tier of the United States. It is an early-season species; in southern localities emergence starts in late May and is almost over by mid July (Teskey 1960; Leprince and Lewis 1982), whereas farther north it has been collected into early August.



Map 50. Collection localities of *Hybomitra illota*.

Hybomitra itasca Philip

Fig. 32; Map 51

Tabanus itasca Philip, 1936*b*:149.
Hybomitra itasca: Philip, 1947:295.

Female. Length 10–14 mm. Eye rather sparsely pubescent, with 4 narrow greenish blue transverse bands on dark purplish background (Fig 32*a*). Frons about 2.5 times as tall as basal width, moderately widened above; basal and median calli and ocellar tubercle yellow to dark brown. Subcallus pruinose. Scape, pedicel, and much of basal flagellomere yellowish orange, with remainder black; basal flagellomere 1.3–1.5 times as long as greatest width, with little or no dorsal angle or excavation. Second palpomere yellowish white, 3.1–3.7 times as greatest diameter (Fig. 32).

Thorax gray pruinose, reddish on notopleural lobe and upper anepisternum; scutum with usual faint longitudinal stripes. Legs, including coxae, reddish; tarsi darkened; legs mainly white-haired, including weak posttibial fringe. Wing membrane clear.

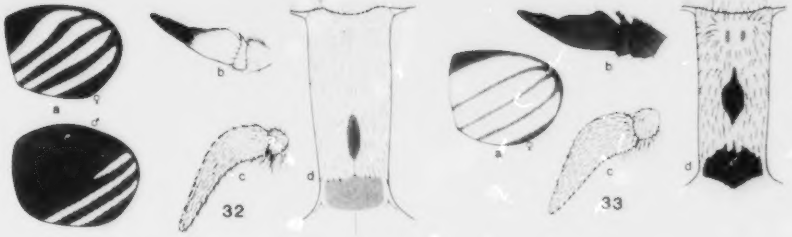
Abdomen black, with median and sublateral pale grayish to pinkish spots on each tergite arising from narrow pale posterior margins of tergites; tergites with median spots triangular, sublateral spots skewed mesally, and hair generally concolorous with integument where located. Sternites more or less reddish, with any blackening occurring laterally and on caudal sternites; anterior sternites white-haired.

Male. Similar to female except as follows: Antenna more slender; gena predominantly black-haired; second palpomere pale brown, slender, oval, about 2.5 times as long as greatest diameter; eye with upper of 3 green stripes abbreviated (Fig. 32*a*); first 2 abdominal sternites mostly black, with some black hair medially.

Remarks. This rarely collected species is most similar to *H. typhus* (Whitney) in general body coloration and pattern, pale notopleural lobe, broad frons with yellow to brown basal and median calli, and antennae and palps having similar dimensions. However, it is easily distinguished from *H. typhus* by the concolorous orange brown femora and tibiae and from other species by the previously mentioned combination of characteristics.

Larvae have been found in sphagnum moss in bogs or bog-like situations.

Distribution. *Hybomitra itasca* has been found in widely separated localities from Alaska to Labrador (Map 51), with the type locality in Minnesota. It has been collected from late June to mid August.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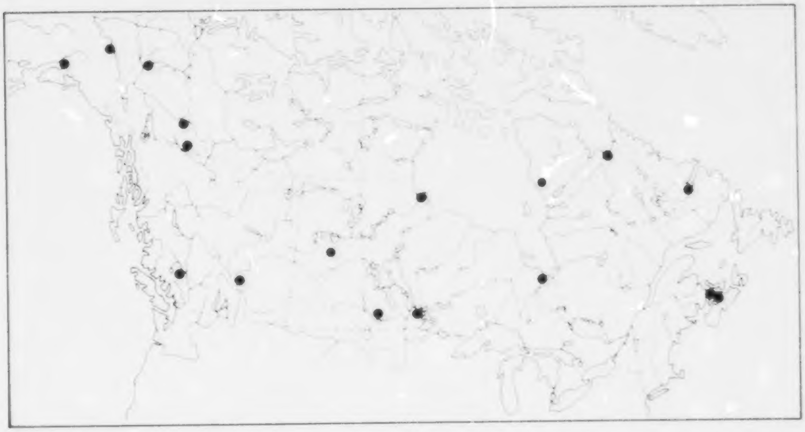
Figs. 32, 33. Head features of *Hybomitra itasca* (32) and *H. lanifera* (33).



Map 51. Collection localities of *Hybomitra itasca*.

Hybomitra lanifera (McDunnough)

Fig. 33; Map 52

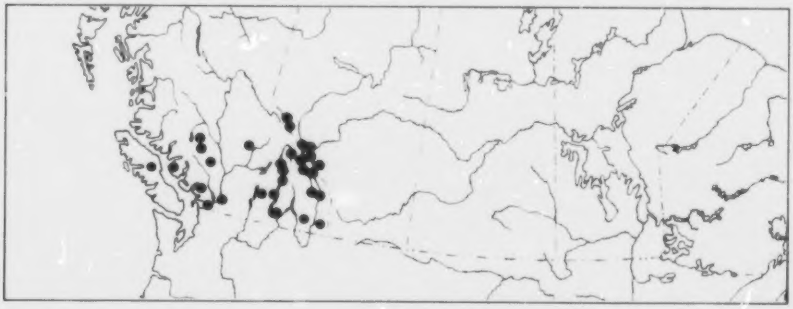
Tabanus laniferus McDunnough, 1922:239.
Hybomitra lanifera: Philip, 1947:295.

Female. Length 10–14 mm. Eye densely long pubescent, with 4 broad greenish blue bands separated by narrow dark reddish purple bands and with upper and lower margins somewhat more broadly reddish purple (Fig. 33*a*). Frons relatively broad, about 2.5 times as tall as basal width, moderately widened above; ocellar tubercle not denuded or only partly so; basal callus hemispherical; subcallus pruinose, haired laterally. Antenna black; basal flagellomere slender, with dorsal angulation small or absent. Second palpomere 3.0–3.5 times as long as greatest width, black-haired (Fig. 33).

Thorax essentially lacking paler scutal stripes; pale hairs mostly restricted to prothorax, laterotergite, and alar lobes. Wing clear, except for yellowish costal cell.

Abdomen black, with mainly black hairs; segments with narrow border of white hairs posteriorly; tergite 2 with sides sometimes faintly reddish orange.

Male. Similar to female except for almost completely black hairs.



Map 52. Collection localities of *Hybomitra lanifera*.

Remarks. The dominantly black integument of this species without distinct emphasis of pale body markings is shared only by *H. procyon* (Osten Sacken) and some *H. osburni* (Hine). However in *H. procyon* the almost total lack of any white hairs and in *H. osburni* the presence of denuded glossy subcallus clearly differentiate them.

Distribution. *Hybomitra lanifera* is present in southern British Columbia and southwestern Alberta (Map 52) and extends south to California. Its reported presence in Alaska (Philip 1965) has not been confirmed. Collection dates extend from 12 July to 30 August.

Hybomitra lasiophthalma (Macquart)

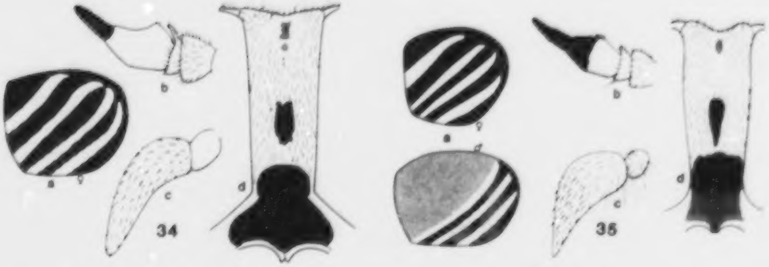
Figs. 34, 181; Map 53

Tabanus lasiophthalma Macquart, 1838:147.
Tabanus punctipennis Macquart, 1847:39. Preocc. Macquart, 1838.
Tabanus notabilis Walker, 1848:166.
Tabanus fretus Stone, 1938:154.
Hybomitra lasiophthalma: Philip, 1947:295.

Female. Length 12–16 mm. Eye densely pilose, with 4 narrow greenish blue bands on reddish purple background (Fig. 34*a*). Frons brownish gray, pruinose; length 3–3.5 times basal width, widened above; ocellar tubercle mostly pruinose; median callus small, isolated from basal callus; basal callus shiny, reddish brown. Subcallus mainly denuded, except for lateral margins, and concolorous with basal callus. Antenna mainly yellow to orange, terminal flagellomeres black; basal flagellomere with some darkening in dorsal excavation and with distinct dorsal angulation. Second palpomere creamy white, moderately swollen, about three times as long as greatest width, with black hair restricted to distal two-thirds of lateral surface (Fig. 34).

Thorax grayish pruinose laterally, mainly blackish dorsally, with four faint longitudinal narrow grayish stripes; notopleural lobes reddish. Legs with coxae and much of femora grayish black; apices of mid and hind femora and all tibia and tarsi reddish. Wing with costal cell and margins of all veins, furcations, and crossveins prominently pigmented.

Abdomen dorsally with median black stripe narrowest on tergite 3; first 4 tergites with sides broadly orange, the orange sides with sublateral oblique to oval paler areas bearing only yellowish hairs (Fig. 181); tergites with yellow hairs also on lateral and posterolateral margins and on posteromedial spots, and with black hair predominant elsewhere. Sternites mainly orange; sternite 1 with median black spot; much or all of sternites 6 and 7 black; sternites yellow-haired, except sternites 6 and 7.



Figs. 34, 35. Head features of *Hybomitra lasiophthalma* (34) and *H. liorhina* (35).

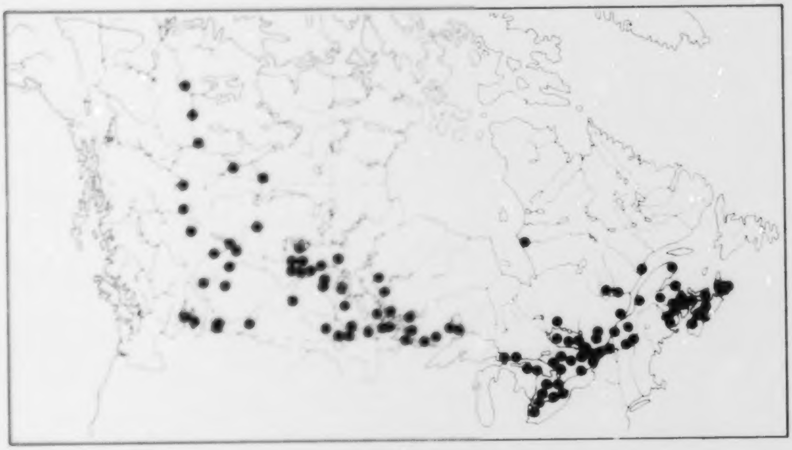
Abdomen dorsally with median black stripe narrowest on tergite 3; first 4 tergites with sides broadly orange, the orange sides with sublateral oblique to oval paler areas bearing only yellowish hairs (Fig. 181); tergites with yellow hairs also on lateral and posterolateral margins and on posteromedial spots, and with black hair predominant elsewhere. Sternites mainly orange; sternite 1 with median black spot; much or all of sternites 6 and 7 black; sternites yellow-haired, except sternites 6 and 7.

Male. Similar to female except as follows: Eye mainly dark, with 3 greenish transverse bands in lower half; ommatidia in upper half about 1.8 times as large as in lower portion, but two areas lacking distinct line of differentiation. Basal flagellomere narrower. Palpus oval, one-half to two-thirds as wide as long. Body slightly darker, as a result of longer more abundant black hair; sternites 1 and 2 black medially; terminal 3 sternites often black; all sternites with some black hair medially.

Remarks. *Hybomitra lasiophthalma* is easily recognized by its denuded subcallus, orange sides of the abdomen, and dark spots on crossveins and bifurcation of R_{4+5} of the wing.

It is one of the most abundant species in many parts of Canada, particularly in the east and midwest, where it can be a severe pest of livestock and humans (Teskey 1960).

The shiny, black, multitiered, tar-drop-like egg masses are laid on emergent vegetation. Larvae have been found in a wide variety of wetland sites, such as sphagnum bogs, river backwaters, partly submerged rotting logs, and shrub-sedge marshes.



Map 53. Collection localities of *Hybomitra lasiophthalma*.

Distribution. The species has been recorded from Norman Wells, N.W.T., to Robson, B.C., and in Nova Scotia (Map 53), with a western tongue extending to Utah. It occurs in most of the eastern United States except Florida and parts of adjacent states. Adults are early-season fliers, collections having been made from late May to near the end of July, with most in June.

Hybomitra liorhina (Philip)

Fig. 35; Map 54

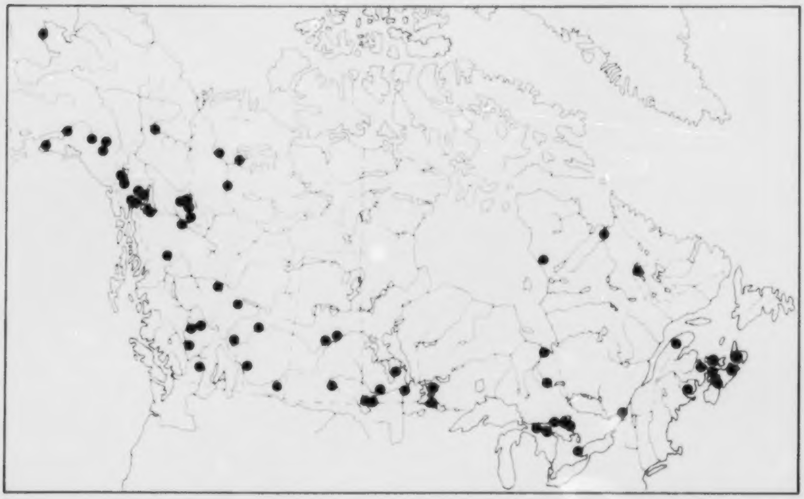
Tabanus liorhina Philip, 1936*b*:151.
Hybomitra liorhina: Philip, 1947:295.

Female. Length 11–15 mm. Eye pubescent, with 4 narrow bluish green bands on a dark purplish background. Frons grayish pruinose, 2.5–3 times as tall as basal width, widened above; ocellar tubercle small; median callus usually joined to subquadrate basal callus; basal callus almost width of frons. Subcallus with all but lateral margins denuded. Antenna with scape, pedicel, and as much as basal half of basal flagellomere reddish orange; remainder of antenna black; basal flagellomere slender, with little or no dorsal angle and excavation. Clypeus and gena mainly white-haired; gena with a few black hairs dorsally. Second palpomere yellowish white, strongly swollen, about 2.5 times as long as greatest width (Fig. 35).

Thorax black; postpronotal lobe creamy white; notopleural lobe reddish; scutum with slender median and sublateral grayish stripes. Legs more or less brown; only apex of fore tibia and fore tarsi darkened. Wing clear; spur vein usually present at fork of R_{4+5}.

Abdomen dominantly black; tergites with sides sometimes having orange tinge; tergites 2–5 or 6 with median and sublateral grayish areas bearing white hairs; lateral and posterolateral margins also with white hairs. Sternites black, tinged with orange on anterior segments; posterior margins narrow, paler, and mainly white-haired, with black hairs intermixed medially.

Male. Differing from female as follows: Eye densely long, pale-haired; ommatidia of upper median area slightly enlarged and not sharply differentiated from lower, smaller ommatidia. Antenna with scape and pedicel partly black; basal flagellomere more slender. Genae completely black-haired. Second palpomere 2.5–3 times as long as greatest width, oval or tapering to blunt apex. Thorax and abdomen with longer black hairs. Legs darker, sometimes blackish brown. Abdominal tergites more strongly orange-tinged laterally; median and sublateral paler spots reduced. Sternites prominently black-haired.



Map 54. Collection localities of *Hybomitra liorhina*.

Remarks. The general coloration and abdominal pattern of *H. liorhina* is similar to those of a number of other species. However, its brownish legs and notopleural lobe and its denuded, glossy subcallus readily differentiate the species. It is apparently not very abundant at any locality, collections of only one or two specimens being the rule.

Distribution. The species is widely distributed from the Seward Peninsula in Alaska to Labrador and Nova Scotia (Map 54), with the only recorded incursion into the United States being Minnesota. However, L.L. Pechuman has also seen specimens from Michigan, Wisconsin, North Dakota, and Wyoming. Its flight period is normally from July to mid August.

Hybomitra longiglossa Philip

Figs. 36, 170; Map 55

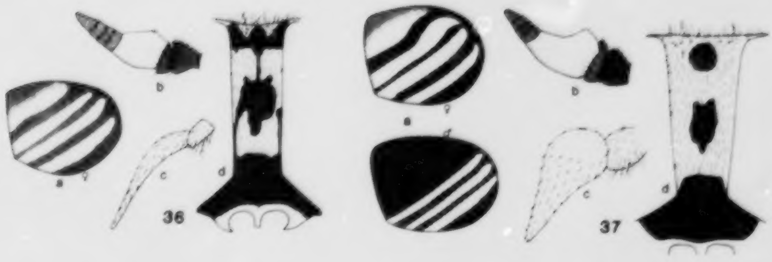
Tabanus longiglossus Philip, 1931:110.
Hybomitra longiglossa: Philip, 1947:296.

Female. Length 10–14 mm. Eyes sparsely pubescent, with 4 greenish bands (Fig. 36*a*). Frons 3.0–3.5 times as tall as basal width, parallel to slightly widened above; basal and median calli and denudation at vertex with quite irregular margins. Subcallus, central portion of clypeus, and adjacent parts of genae denuded and shiny; clypeus and gena pale-haired. Antenna short and stalky, black, except for orange basal flagellomere; basal flagellomere with obtuse dorsal angle and no excavation. Second palpomere light brown, about five times as long as basal width; proboscis lengthened so that palps do not reach base of labellae (Fig. 36).

Scutum subshiny black, nearly unlined; notopleural lobe orange. Legs dominantly orange; coxae and base of femora black. Wing with costal cell and margin of basal veins darkened.

Abdomen with tergites mainly subshiny black; tergites 1–3 with sides diffusely reddish orange; tergites with caudal margins narrowly paler (Fig. 170); hair mainly black; tergites 1 and 2 with lateral margins, caudal margins, and sublateral median areas with pale hairs. Sternites more or less orange to almost black, with mostly white hair and with some black hair medially on posterior segments.

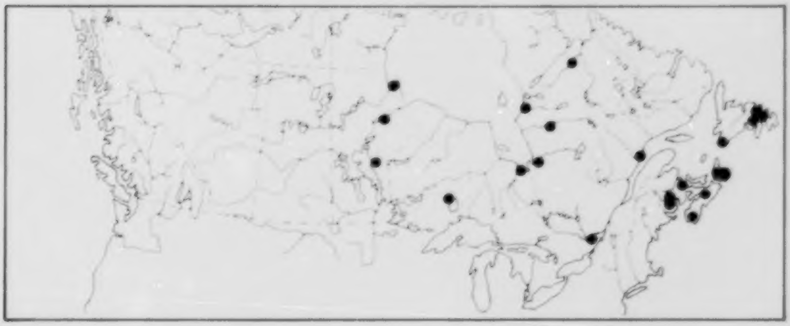
Male. Similar to female except as follows: Eyes densely pubescent; centromedial ommatidia slightly enlarged. Second palpomere brown, equal to or smaller than first flagellomere; proboscis of normal length. Notopleural lobe black to faintly reddish. Abdomen darker, with pale hairs only on posterior margin.



Figs. 36, 37. Head features of *Hybomitra longiglossa* (36) and *H. lurida* (37).

Remarks. This species is most similar to *H. sexfasciatus* (Hine) but is readily separated by characters given in the key.

Larvae have been found in a sphagnum bog that lacks open water (Teskey and Burger 1976).



Map 55. Collection localities of *Hybomitra longiglossa*.

Distribution. The species has been collected in widely scattered localities in the eastern half of Canada (Map 55), in Minnesota, and south to Massachusetts in the United States. Collection dates for adults range from late May to mid July, with one record from Cape Breton on 5 August.

Hybomitra lurida (Fallén)

Fig. 37; Map 56

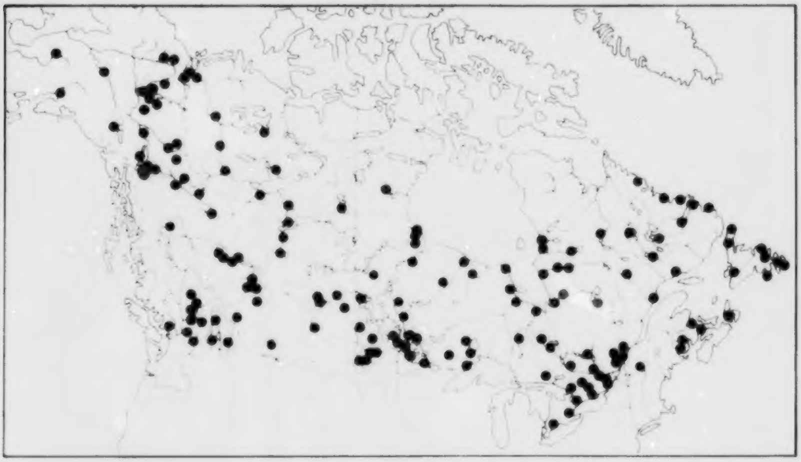
Tabanus lurida Fallén, 1817:5.
Tabanus metabola McDunnough, 1922:239.
Hybomitra lurida: Pechuman and Stone, 1968:100.

Female. Length 12–15 mm. Eye densely pubescent, with 4 broad bluish green bands (Fig. 37*a*). Frons 3.0–3.5 times as tall as basal width, widened above; all calli denuded and shiny; median callus usually black; subcallus, basal callus, and ocellar tubercle mahogany brown; basal callus flat and wrinkled. Antenna mainly black; basal flagellomere with basal half (or more) reddish; basal flagellomere slightly longer than greatest width, with moderate dorsal angle and excavation. Second palpomere yellowish white, about 2.5 times as long as greatest width (Fig. 37).

Scutum with faint sublateral but no median pale stripes; notopleural lobe reddish. Legs with coxae and femora black; tibiae and all but fore tarsi orange brown. Wing with costal cell, margins of basal veins, crossveins, and fork of R_{4+5} darkened.

Abdominal tergites dominantly black; tergites 2 and often 3 with sides more or less orange; tergites 2 to 4 or 5 with overriding grayish to yellow pruinose areas involving narrow posterior and lateral margins and sublateral oblique patches on discs of segments, the paler areas white-haired; remaining tergites black-haired. Sternites extensively reddish to almost black; posterior margins narrowly pale; anterior sternites predominantly white-haired.

Male. Similar to female except as follows: Eyes with centromedial ommatidia very slightly enlarged. Basal flagellomere narrower. Genae completely black-haired. Palpus subglobose to broadly oval. Abdomen with sides of tergites 2 and 3 having more prominently orange coloring, with overlying sublateral oblique whitish patches often less apparent. Sternite 1, median and lateral areas of sternite 2, and sternites 4 or 5 to 7 black; remaining sternites more or less yellowish orange, predominantly black-haired.



Map 56. Collection localities of *Hybomitra lurida*.

Remarks. This very common species was called *H. metabola* McDunnough until Pechuman and Stone (1968) recognized it as being the same as a European species whose name, *H. lurida*, had priority.

Larvae of *H. lurida* have been most commonly found in sphagnum bogs and in a variety of other common wetland habitats (Teskey 1969).

Distribution. The species is present transcontinentally from Alaska to Newfoundland (Map 56), south to Colorado along the Rocky Mountains, and into the northern midwest and eastern United States. Its Palaearctic range extends from Great Britain through continental Europe and Siberia to the Bering Sea coast. The flight period in Canada is from late May to early August.

Hybomitra melanorhina (Bigot)

Figs. 38, 182; Map 57

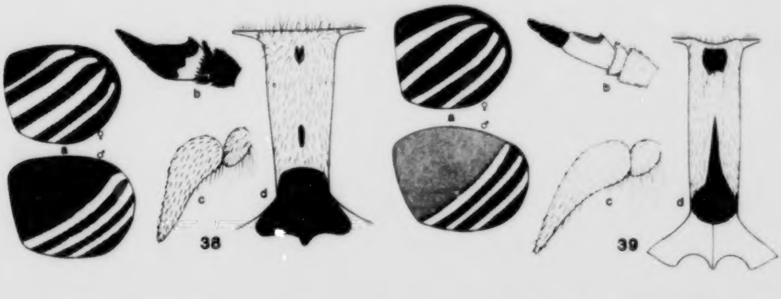
Therioplectes melanorhina **Bigot, 1892:642**
Hybomitra melanorhina**: Philip, 1947:296.**

Female. Length 13–15 mm. Eye densely short pilose, with 4 bluish green bands on a dark purplish background. Frons 3.0–3.5 times as tall as basal width, widened above; ocellar tubercle usually with only area of vestigial lateral ocelli denuded; median callus small, linear to oval; basal callus convex and, together with subcallus, glossy dark reddish brown to black. Antenna mainly black; base of basal flagellomere and occasionally scape and pedicel reddish; basal flagellomere rather slender, with obtuse dorsal angle and only slight, if any, excavation. Clypeus and gena gray, with black and white hair. Second palpomere creamy white, about three times as long as greatest width, black-haired, with some white hairs basally (Fig. 38).

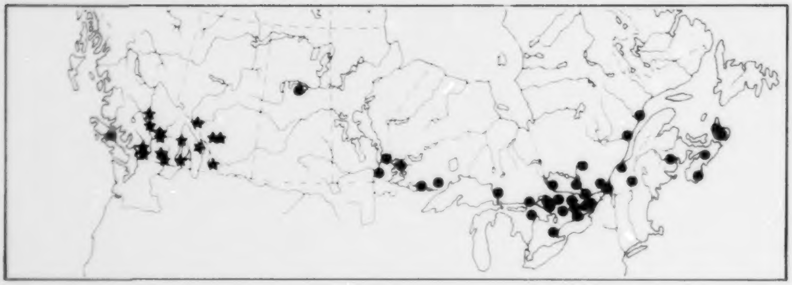
Scutum with usual median and sublateral faintly paler longitudinal stripes; notopleural lobe reddish. Legs mainly black; basal half of fore tibia and all of mid and hind tibiae yellowish. Wing with costal cell and sometimes margins of crossveins and fork of R_{4+5} faintly pigmented.

Abdomen dorsally predominantly black with black hair; anterior tergites often more or less extensively reddish laterally; tergites with overriding gray pruinose white-haired pattern involving narrow posterior margins and median triangular and sublateral oblique patches, strongest on tergite 2 (Fig. 182); median triangles slender and nearly crossing tergites. Sternites 2–4 usually orange; tergite 2 with a median dark patch; remaining sternites black, with white hairs to sternite 4 and progressively more black hairs on following sternites.

Male. Similar to female except as follows: Eye with upper median ommatidia slightly enlarged; costal cell distinctly infuscated; anterior abdominal tergites more prominently orange, with paler white-haired areas restricted to posterior margins; sternites dominantly black-haired.



Figs. 38, 39. Head features of *Hybomitra melanorhina* (38) and *H. microcephala* (39).



Map 57. Collection localities of *Hybomitra melanorhina* (★) and *H. microcephala* (●).

Remarks. This species should be quite easy to identify, based on the denuded subcallus and distinctive body color pattern. It is relatively common in British Columbia.

Larvae were commonly found in moss growing among emergent herbaceous vegetation on gently sloping margins of shallow ponds, in organic soils bordering a woodland pool, and in a shallow channel through a beaver meadow (Teskey 1985).

Distribution. The species reaches its northern limits in southern British Columbia and southwestern Alberta (Map 57), and extends south to California and Colorado. Adults are active from late May to about the end of July in Canada.

Hybomitra microcephala Osten Sacken

Figs. 39, 192; Map 57

Therioplectes microcephalus Osten Sacken, 1878:56.
Hybomitra microcephala: Philip, 1947:296.

Female. Length 13–17 mm. Head relatively small, narrower than thorax. Eyes very sparsely short pilose, with 4 narrow, greenish blue bands on a dark background. Frons about 3.5 times as long as basal width, only slightly, if at all, widened above; ocellar tubercle weakly developed; anterior ocellus frequently the only one accentuated, other than general denudation of area; reddish brown basal callus usually broadly joined to darker linear median callus to form lanceolate figure. Subcallus pruinose. Antenna with scape, pedicel, and basal flagellomere predominantly orange; scape and pedicel white-haired; basal flagellomere very slender, with almost no dorsal angle or excavation. Clypeus and gena white-haired. Palpus yellowish white, 2.5–3 times as long as greatest width, usually with a few black hairs on apical half (Fig. 39).

Thorax with faint scutal striping, predominantly yellow-haired, especially on scutellum; notopleural lobe black. Legs with coxae grayish pruinose; remaining segments orange brown, with predominantly white hair. Wing clear.

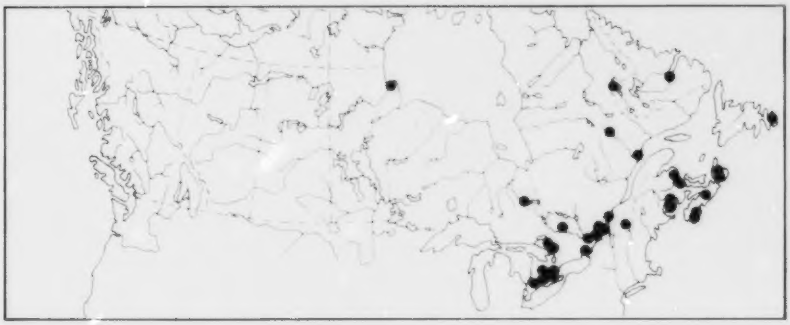
Abdominal tergites mostly black; sides of tergite 1, progressively smaller median triangles and sublateral patches, and narrow caudal margins of tergites 2–6 gray; pale median triangles almost crossing tergites 2 and 3; sublateral triangles slightly skewed medially; hairing concolorous with integument where located (Fig. 192). Sternites predominantly grayish orange; sternite 1, centre of sternite 2, and sides of sternites 2–7 black; sternite 7 with black hair only medially.

Male. Darker than female. Eye with slightly longer but still relatively short hairs; dorsomedial ommatidia moderately enlarged. Costal cell lightly pigmented. Abdomen with sides of tergites 2–4 orange, masking paler sublateral patches; sublateral patches and very small median triangles visible only as restricted patches of pale hairs. Sternites dominantly white-haired, with sparse black hairs medially on sternites 3–7.

Remarks. This species is infrequently collected by net, but in suitable areas it may be taken in moderate numbers in traps baited with carbon dioxide and in malaise-type interception traps. Pechuman (1981) observed that adults were usually collected in hilly country, which is confirmed by the species' Canadian distribution. Pechuman (1981) and Leprince et al. (1983) note that males are often seen in spots of sunlight on woodland roads and on the leaves of trees.

A larva of this species, found in a well-decayed log in a hillside forest, was described by Teskey and Burger (1976) and is further evidence of the forest habitat of this species.

Distribution. The distribution of this species extends from La Ronge, Sask., to Cape Breton Island, N.S. (Map 57), and south along the Appalachian Mountains to South Carolina. This is a late-season flier in Canada, collections having been made from late June to the latter part of August.



Map 58. Collection localities of *Hybomitra minuscula*.

Hybomitra minuscula (Hine)

Figs 40, 184; Map 58

Tabanus minusculus Hine, 1907:226.
Hybomitra minuscula: Philip, 1947:296.

Female. Length 10–13 mm. Eye sparsely short pilose, with 4 narrow greenish blue bands on a dark background. Frons about three times as tall as basal width, slightly broader above; ocellar tubercle and associated denuded areas small, usually with narrow denuded lines diverging from lower margin to outer corners of basal callus; median callus normally broadly connected to basal callus to form a lanceolate figure. Subcallus pruinose. Antenna mainly yellowish orange; apical flagellomere and apex of basal flagellomere darkened; basal flagellomere with dorsal angle and excavation essentially absent. Clypeus and gena mainly white-haired; upper genae with a few black hairs. Second palpomere yellowish brown, 4.5–5 times as long as basal width.

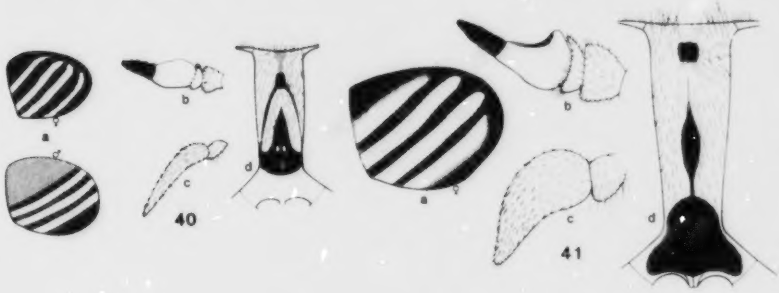
Thorax with very faint scutal striping; notopleural lobe yellowish orange. Legs brown; base of hind femur sometimes darkened. Wing with costal cell and margins of crossveins faintly pigmented (Fig. 40).

Abdomen occasionally predominantly black; tergites 1–4 with sides usually orange brown; median black stripe nearly parallel-sided; tergites 2 to 4 or 5 with paler median triangles and sublateral patches, a result of pale hairs and paler integument in these areas (Fig. 184). Sternites with more or less black or orange shading in relation to tergites; sternites 2–7 with conspicuous black hairs medially.

Male. Similar to female except as follows: eyes with upper facets slightly enlarged but not sharply outlined; palpus oval to bluntly tapered apically, usually lightly darkened on outer basal surface; legs with coxae, femora, apex of fore tibia and fore tarsus nearly black; abdomen with black and orange pattern brighter and median gray triangles reduced, sternites black-haired, except on posterior margin.

Remarks. This species is restricted to sphagnum bogs, the adults never venturing very far beyond the perimeter of the bog. Larvae have been found only in bogs, and usually in the wetter, quaking parts on the perimeter of the central pond.

Distribution. Apart from a record in Churchill, Man., the species is known only from eastern Ontario to Newfoundland (Map 59) and in the eastern United States from Minnesota to West Virginia. Canadian specimens were collected from late June to the end of August.



Figs. 40, 41. Head features of *Hybomitra minuscula* (40) and *H. nitidifrons* ssp. *nuda* (41).

Hybomitra nitidifrons ssp. *nuda* (McDunnough)

Fig. 41; Map 59

Tabanus nitidifrons Szilady, 1914:664.
Tabanus nuda McDunnough, 1921:143.
Hybomitra nitidifrons nuda: Pechuman, 1981:25.

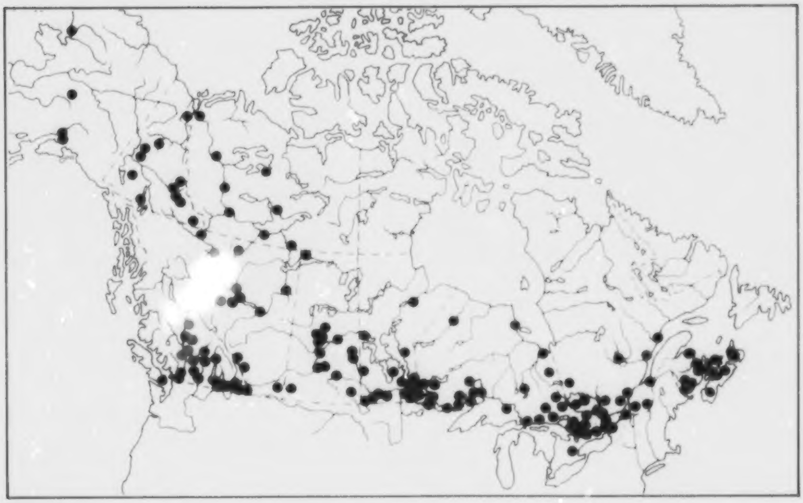
Female. Length 14–17 mm. Eye densely short pilose, with 4 greenish bands on dark purple background and with 2 broad central bands, the outer bands narrow and with color muted (Fig. 41*a*). Frons 3.5–4 times as tall as basal width, widened above; orange denuded area small, associated with ocellar tubercle; median callus narrow, usually separate from basal callus; basal callus flat and more or less wrinkled. Subcallus denuded and shiny. Antenna with scape, pedicel, and basal flagellomere mostly orange; basal flagellomere broad, with acute dorsal angle and prominent excavation. Gena with abundant black hair. Second palpomere creamy white, about 2.5 times as long as greatest diameter (Fig. 41).

Thorax nearly black, usually with only faint submedian scutal stripes visible; notopleural lobe light brown; postpronotal lobe yellowish white. Coxae and femora grayish black; tibiae and mid and hind tarsi reddish; fore tarsi black. Wing with costal cell, margins of basal veins, and fork of R_{4+5} moderately tinted.

Abdomen broadly orange brown laterally on tergites 1 to 4 or 5, with median black stripe tapered to tergite 3; remaining tergites mostly black; posterior tergal margins narrowly gray pruinose; middle tergites with yellowish hairs and patches of similar hairs sublaterally connected to marginal hairs; tergites black-haired elsewhere. Sternites mostly yellowish orange with white hair; sternite 1, usually a median patch on sternite 2, and more or less of last 3 sternites black, with progressively more black hair on last 3 sternites.

Male. Similar to female except as follows: Eye with 3 greenish stripes on lower half; ommatidia only slightly differentiated in size. Subcallus silvery pruinose. Second palpomere oval, creamy white to light brown, about 1.5 times as long as greatest diameter. Outer fore tarsal claw longer than inner claw. Abdominal sternites with mixed black and white hair medially.

Remarks. *Hybomitra nuda* has been treated as a full species in most of the literature. Pechuman (1981*a*) was the first North American writer to acknowledge its close relationship with the European and Asian *H. nitidifrons* (Szilady) by considering it a subspecies of the latter, following the lead of Olsufjev (1977) and Leclercq and Olsufjev (1981).



Map 59. Collection localities of *Hybomitra nitidifrons* ssp. *nuda*.

This subspecies is abundant throughout much of Canada and Alaska and is a pest over much of this area. Males have been found hovering near the ground along rocky paths and in clearings in wooded areas, and resting on sunlit rock near the tops of mountains or large hills (Pechuman 1981; Leprince et al. 1983).

Larvae have been found in saturated moss in woodland swamps and the margins of deep rocky pools (Teskey 1969).

Distribution: Northern Bering Sea coast in Alaska to Cape Breton, N.S. (Map 59). Considering the far northern distribution in the west, I find the absence of this subspecies from northern Quebec and Labrador surprising. Its southern limits include the northeastern and northwestern United States. It is among the first to fly in the spring, with records from early May in British Columbia, and is essentially absent by mid July, even in northern localities.

Hybomitra opaca (Coquillett)

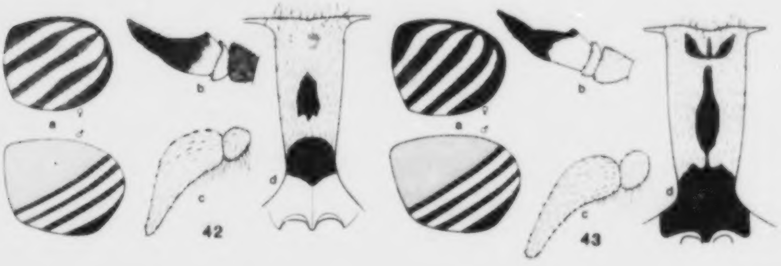
Fig. 42; Map 60

Tabanus opacus Coquillett, in Baker, 1904:21.
Hybomitra opaca: Philip, 1947:296.

Female. Length 12–15 mm. Eye with dense short white hairs and 4 greenish bands on dark background. Frons 3.0–3.5 times as tall as basal width, distinctly widened above; ocellar tubercle with denudation restricted to rounded curvature of tubercles; median callus subquadrate to oval, usually separated from basal callus; basal callus convex, rounded above, smooth-surfaced, with small denuded projection onto upper margin of otherwise pruinose subcallus. Antenna predominantly black, often with pedicel and base of flagellum and, more rarely, scape orange brown; basal flagellomere moderately broad, with obtuse dorsal angle and very shallow excavation. Gena with black and white hair. Second palpomere creamy white, 2.5–3.0 times as long as basal width, with mixed black and white hair (Fig. 42).

Thorax dominantly gray to black, with distinct paler median and sublateral scutal stripes; notopleural lobe orange brown. Coxae and femora grayish black; tibiae and tarsi mainly yellowish orange; fore tarsi and apex of fore tibia darkened; coxae and femora, except fore femur, largely white-haired; hind tibial fringe black. Wing with costal cell hyaline to faintly tinted.

Abdomen grayish black dorsomedially, shading to orange brown laterally, with median and sublateral paler white-haired patches; median patches in form of slender triangles; submedian patches linear-oblique; lateral and posterolateral tergal margins also white-haired; tergites black-haired elsewhere. Sternites predominantly orange; at least centre of sternite 1, usually median spot on sternite 2, and more or less of sternites 5–7 grayish black; all but sternites 5–7 completely white-haired.

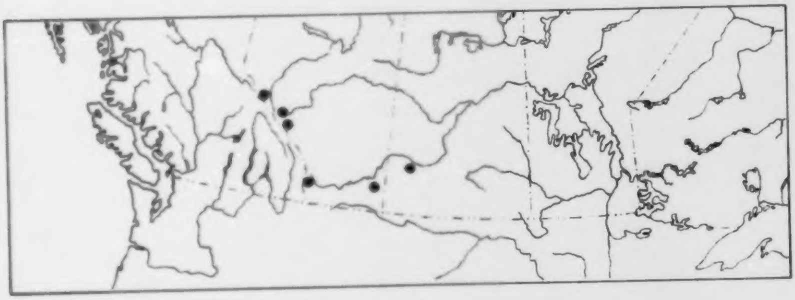


Figs. 42, 43. Head features of *Hybomitra opaca* (42) and *H. osburni* (43).

Male. Similar to female except as follows: Basal flagellomere more slender. Eye densely long, pale pilose; upper ommatidia very slightly enlarged. Gena with predominantly black hairs. Second palpomere oval, about twice as long as broad.

Remarks. Among western species sharing the same general range as *H. opaca*, only *H. frontalis* (Walker), *H. pediontis* (McAlpine), *H. tetrica* (Marten), *H. rupestris* (McDunnough), and *H. melanorhina* (Bigot) are similar to *H. opaca* in body coloration and pattern. *Hybomitra rupestris*, *H. melanorhina*, and the typical variety of *H. tetrica* (Marten) are readily distinguished by their glossy black subcallus. *Hybomitra tetrica* var. *hirtula* (Bigot) often has the frons and frontal callus much like *H. opaca* but can normally be distinguished from it by the strong spur vein from the fork of R_{4+5}. The same frons and callus features of *H. opaca* are, in most cases, useful in its separation from *H. pediontis* and *H. frontalis*. The only exceptions are instances of possible hybridization as suggested by McAlpine (1961).

Distribution. Canadian records of this species are only from Alberta (Map 60), where most records are from the southeastern slopes of the Rocky Mountains. Its range extends south to Colorado and eastern montane California. Canadian collections have been made from late June to early August.



Map 60. Collection localities of *Hybomitra opaca*.

Hybomitra osburni (Hine)

Figs. 43, 188; Map 61

Tabanus rhombica ssp. *osburni* Hine, 1904:241.
Hybomitra osburni: Philip, 1931:114.

Female. Length 12–15 mm. Eye densely short pilose, with 4 greenish bands on dark purplish background. Frons grayish, 2.6–3.4 times as tall as basal width, usually distinctly widened above; ocellar tubercle usually prominent, with posteriorly diverged denuded streak on either side; median callus oval to elliptical, often with slender extensions above and below. Subcallus at least partly denuded, usually entirely so, usually with hairs laterally. Antenna usually with scape, pedicel, and base of basal flagellomere grayish yellow to orange; remainder of antenna black, but scape and pedicel sometimes black; basal flagellomere relatively narrow, with little or no dorsal angle and excavation. Clypeus and gena gray pruinose; genae with white hair and sparse black hairs dorsally. Second palpomere light yellowish brown, moderately swollen at three to four times as long as greatest width (Fig. 43).

Thorax black, sparsely gray pruinose, with very faint scutal striping; notopleural lobe black; pleura black and white-haired. Legs nearly black; tibiae and tarsi with reddish tones. Wing with costal cell, margins of crossveins, and furcation of R_{4+5} lightly pigmented.

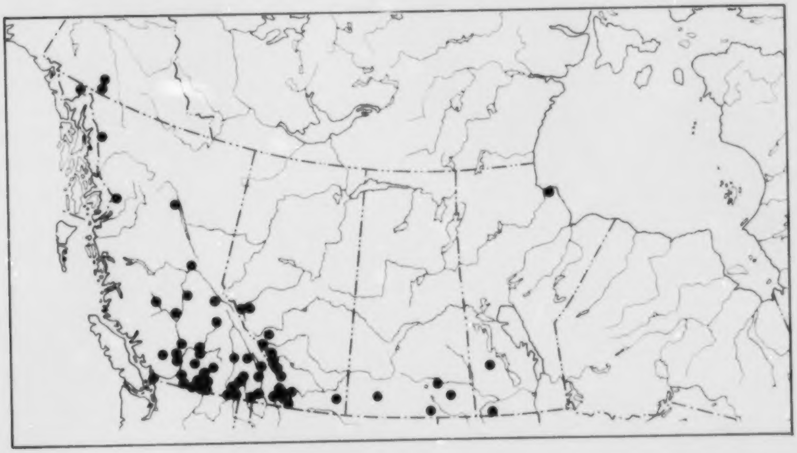
Abdominal tergites subshiny black, dominantly black-haired; medial and sublateral patches gray pruinose, white-haired, arising from posterior margins of tergites (Fig. 188). Sternites less shiny black, predominantly white-haired, with black hairs intermixed medially and becoming more abundant on posterior sternites.

Male. Similar to female, including denuded shiny subcallus. Differs from female as follows: second palpomere spherical to oval, completely black-haired; antenna more slender; abdomen narrowly orange brown laterally on tergites 2 and 3, with white-haired median and sublateral patches reduced to faint fringing lines of white hairs; sternites usually partly orange, with black and white hair generally mixed.

Remarks. The relationship of this species to *Hybomitra rhombica* (Osten Sacken), which has seen *H. osburni* treated variously as a valid species or as a subspecies, variety, or synonym of *H. rhombica*, can never be satisfactorily settled until a detailed study of many specimens from the entire range of the two forms can be undertaken. However, on the basis of mainly Canadian specimens, there is justification for recognizing two separate species, with the one here considered to be *H. rhombica* being quite rare in relation to the numbers of *H. osburni* that have been seen.

Hybomitra osburni is darker and more shiny than *H. rhombica* as a result of less body pruinosity and smaller median and sublateral tergal spots. The palps almost always have at least some black hairs dorsobasally, whereas they are completely pale-haired in this area of *H. rhombica*. The subcallus is usually sparsely haired laterally in *H. osburni* but bare in *H. rhombica*. The mesanepisternum and abdominal sternites of *H. osburni* have some black hair but are completely white-haired on all but the terminal sternites of *H. rhombica*. Finally, the costal cell of *H. osburni* is infuscated but that of *H. rhombica* is as clear as the remaining wing membrane.

Distribution. *Hybomitra osburni* has been collected in all western provinces and the Yukon Territory but is most abundant in British Columbia (Map 61), especially in the southern inland portion. Collections have been made from mid June to early September. Because of the difficulties in separation of this species from *H. rhombica*, the distribution of the two in the United States is not clearly defined.



Map 61. Collection localities of *Hybomitra osburni*.

Hybomitra pechumani Teskey & Thomas

Figs. 44, 169; Map 62

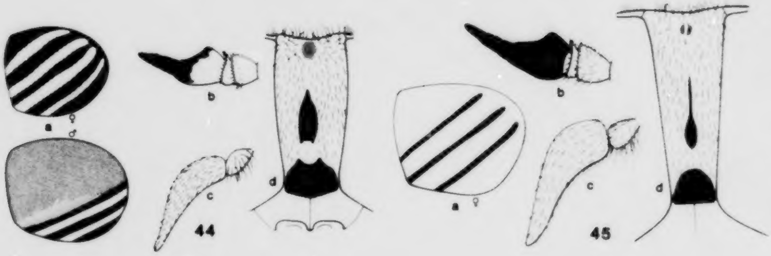
Hybomitra pechumani Teskey & Thomas, 1979:346.
Hybomitra typhus of authors, not Whitney.
Hybomitra typhus (Whitney) Form B, Pechuman 1960:797.

Female. Length 10–13 mm. Eye sparsely pilose, deep purple, with 4 greenish blue bands. Frons gray pruinose, with brown tinges laterally, about three times as tall as basal width, widened above; ocellar tubercle with denudation restricted to tubercle; median callus oval to lenticular, rarely connected to either ocellar tubercle or basal callus; basal callus nearly as high as wide, narrowly separated from eyes. Subcallus pruinose. Antennal scape blackish; pedicel orange brown; flagellum orange brown, with annulate portion and apical third of basal portion black; basal flagellomere with dorsal angle and excavation moderately prominent. Clypeus and gena grayish pruinose, white-haired below, with some black hairs dorsally. Palpus with apical segment pale brown, rather slender at about four times as long as greatest width, with almost totally black appressed hairs (Fig. 44).

Thorax with usual faint longitudinal pale stripes on scutum; notopleural lobe orange brown. Legs black, mainly black-haired; tibiae more or less reddish orange; coxae, mid femur and portion of hind femur white-haired; wing essentially hyaline, although costal cell and margins of veins in base of wing lightly pigmented.

Abdomen dominantly black; tergites 2 to 5 or 6 with median and sublateral light gray triangles based, for the most part, on narrow gray segmental incisures (Fig. 169); sublateral triangles skewed medially; gray areas white-haired; black integument with black hairs. Sternites blackish, sometimes tinged with reddish tones and with light gray incisures; sternites predominantly white-haired but sometimes with sparse black hairs medially.

Male. Eyes densely pilose, with upper area of larger facets conspicuously differentiated from smaller lower facets, sometimes by a pale line at boundary. Basal flagellomere normally narrower and more orange than female. Second palpomere oblong oval, 2.5–3 times as long as wide. Abdomen with tergites 2 and 3 usually somewhat reddish laterally, with sublateral pale spots partly obliterated, and with median spots small. Sternites mostly black, usually tinged with reddish orange, predominantly black-haired; margins narrowly paler with white hairs.

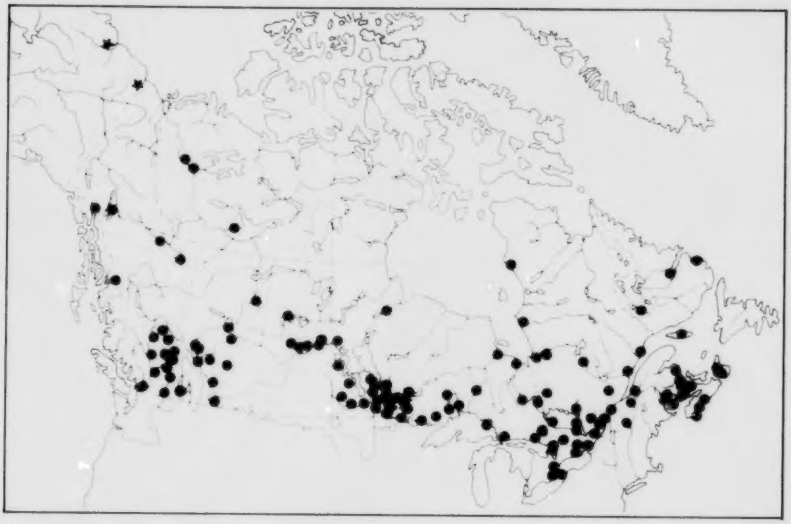


Figs. 44, 45. Head features of *Hybomitra pechumani* (44) and *H. pediontis* (45).

Remarks. Pechuman (1960) and Pechuman et al. (1961) separated two distinct forms of adult *H. typhus* (Whitney). The distinctiveness of these forms was confirmed by isozyme characters (Hudson and Teskey 1976; Hudson 1979). Concordant morphological differences in the immature stages of the two species and further detailed analysis of adult characters led to the description and naming of *H. pechumani* by Teskey and Thomas (1979). Although its close relationship to *H. typhus* seems assured, *H. pechumani* is superficially more similar in size and general body coloration to *H. hearlei* (Philip) and *H. frosti* Pechuman. However, differentiation from these and other species should pose little difficulty.

Immature stages of *H. pechumani* were described by Teskey (1969) under the name of *H. typhus*. Larvae were found in quite varied habitats from acidic to alkaline bogs, woodland swamps, and lakeshores, but always in a moss substrate.

Distribution. *Hybomitra pechumani* is present in all provinces and extends north to near the limit of tabanid distribution, except in the Yukon and Alaska where it is apparently absent (Map 62). The species extends into northern Idaho and adjacent parts of Washington and Montana, the eastern Great Lakes, and the New England States south to West Virginia. The species flight period is from mid June to the end of August.



Map 62. Collection localities of *Hybomitra pechumani* (●) and *H. polaris* (★).

Hybomitra pediontis (McAlpine)

Fig. 45; Map 63

Tabanus pediontis McAlpine, 1961:907.
Hybomitra pediontis: Philip, 1965:340.

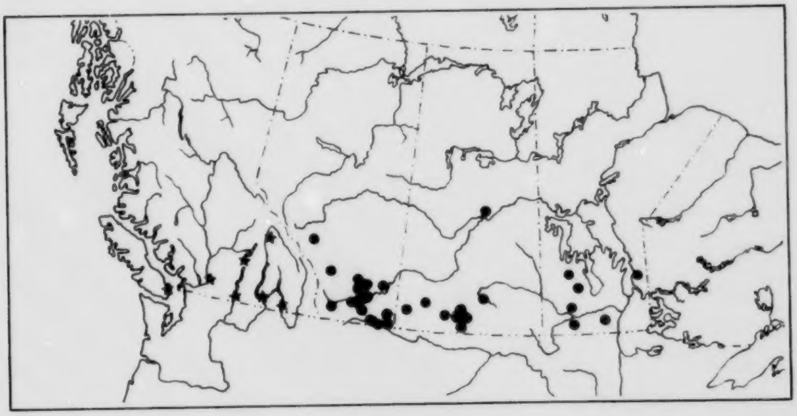
Female. Length 13–16 mm. Eye densely short, pale pilose, bright green, with 3 narrow purplish bands (Fig. 45*a*). Frons 3.3–4.2 times as tall as basal width, moderately widened above; ocellar tubercle with restricted denudation; median callus oval to lenticular; basal callus about as high as wide, narrowly separate from eye margin. Subcallus pruinose. Scape and pedicel more or less orange; flagellum black, except narrow basal orange area; basal flagellomere relatively slender, with obtuse dorsal angle and shallow excavation. Clypeus and gena whitish pruinose, with mostly white hair. Second palpomere creamy white, about three times as long as greatest width, with mixed black and yellow short appressed hair (Fig. 45).

Thorax grayish black, with abundant yellow to white hair intermixed with black hair and faint paler longitudinal stripes. Postpronotal lobe whitish pruinose. Notopleural lobe yellowish orange. Coxae and femora black, pruinose, mostly white-haired; tibiae dominantly yellow orange; apex of fore tibia and tarsi black to dark reddish. Wing membrane clear; usually spur vein from fork of R_{4+5}.

Abdomen with sides of tergites 1 to 3 or 4 broadly orange and outlining a scalloped-edged median black stripe, this pattern overlaid by paler sublateral oval oblique patches and more or less distinct median gray pruinose triangles; such paler areas white-haired; remainder of these and other tergites black-haired. Sternite 1, median patches of variable size on sternites 2 and 3, and much of sternites 4 or 5 to 7 black; remainder of sternites yellowish orange; sternites white-haired, except for black hair on sternites 6 and 7.

Male. Similar to female except as follows: Eye hairs long; upper median area of enlarged ommatidia indistinctly differentiated from surrounding smaller ommatidia. Gena with abundant black hair. Second palpomere broadly oval. Abdominal tergites with paler median triangles and usually sublateral oval oblique patches reduced or absent.

Remarks. McAlpine (1961) considered this species to be most closely related to *H. frontalis* (Walker). However, it is generally more similar to *H. opaca* (Coquillett), especially in the abdominal pattern. But it can be readily distinguished from both of these species by the dominantly green eyes with very narrow purple stripes.



Map 63. Collection localities of *Hybomitra pediontis* and *H. procyon*.

McAlpine (1961) refers to J.A. Shemanchuk's rearing the larvae of this species, obtained from the margin of an alkaline prairie slough, and considered such sites to be the probable normal breeding site. Teskey (1985) provides confirmation of this distinctive habitat and a description of the immature stages of *H. pediontis*.

Distribution: *Hybomitra pediontis* has been collected in the southern prairie and foothill grassland region of Alberta, Saskatchewan, and Manitoba (Map 63) and in similar adjacent regions of the United States south to Utah and South Dakota. Collections of adults have been made from mid June to mid August.

Hybomitra polaris (Frey)

Fig. 46; Map 62

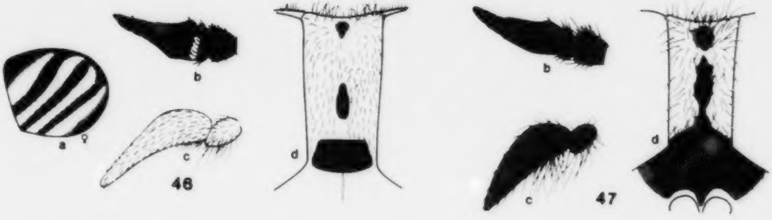
Tabanus polaris Frey, 1915:7.
Tabanus boreus Stone, 1938:147.
Hybomitra polaris: Philip, 1965:340.

Female. Length 13–14 mm. Eye pilose, with 4 greenish bands on dark background; outer green bands diffuse (Fig. 46*a*). Frons about 2.5 times as tall as basal width of about 0.7 mm, only very slightly widened above; ocellar tubercle orange, with restricted denudation; median callus black, oval; basal callus subquadrate, reddish brown, distinctly narrower than frons. Subcallus pruinose. Antenna predominantly black; basal flagellomere with obtuse dorsal angle and little, if any, dorsal excavation. Clypeus and gena with white hair. Second palpomere pale yellowish brown, about 3.3 times as long as greatest width, with mixed black and white hair (Fig. 46).

Thorax with very faint grayish scutal stripes; notopleural lobe black. Legs black to dark brown, with tibia somewhat paler basally. Wing membrane clear.

Abdomen mainly black and black-haired, with posterior margins of segments narrowly gray pruinose; tergites with median triangular and sublateral oblique to round, with gray pruinose patches normally united with gray margins; gray areas plus lateral margins of tergites and all but terminal sternites white-haired.

Male. A specimen in the United States National Museum from the Yukon–Alaska border area, where females have been found, is identified as this species. However, it is too similar to a male of *H. astuta* from Labrador to be sure of the identification, especially as the range of *H. astuta* extends close to that of *H. polaris*.



Figs. 46, 47. Head features of *Hybomitra polaris* (46) and *H. procyon* (47).

Remarks. The female of this species is most similar to the dark form of *Hybomitra frontalis* (Walker), although Olsufjev (1977) made the name synonymous with *H. astuta* (Osten Sacken). However, the distinction from both of these species appears assured: from *H. astuta* by the less prominent scutal stripes, the dominant white hairs on the gena, the almost black basal flagellomere, and the less distinct abdominal pattern; and from *H. frontalis* by the broader frons and the more slender second palpomere.

Distribution. This is a Holarctic species, known in the northern part of the Palaearctic region from Scandinavia through Siberia to Kamchatka (Chvala et al. 1972) and in the Nearctic region only from two localities in Alaska (Map 62). Specimens examined from Umiat, Alaska, were collected in mid July, and the type specimens of *Tabanus boreus* Stone, the name being a synonym of *H. polaris*, were collected near the junction of the Alaska–Yukon border and the Beaufort Sea and were dated 14–17 August (Stone 1938).

Hybomitra procyon (Osten Sacken)

Fig. 47; Map 63

Tabanus procyon Osten Sacken, 1877:216.
Hybomitra procyon: Philip, 1947:297.

Female. Length 11–13 mm. Eye densely long pubescent, with 4 greenish bands on dark background. Frons black, mostly grayish pruinose, about twice as tall as basal width, parallel-sided to slightly widened above; basal callus broader than high, dark-mahogany-colored. Subcallus and parts of gena partly or entirely denuded and glossy; subcallus with patch of hair laterally. Basal flagellomere relatively slender, with almost no dorsal angle or excavation. Second palpomere blackish, 2.5–3 times as long as greatest width, long-haired (Fig. 47).

Thorax and legs black. Wing with costal cell and margins of crossveins and furcation of R_{4+5} pigmented.

Abdomen shiny black dorsally and often dark mahogany brown ventrally, unmarked.

Male. Similar to female except for sexual differences.

Remarks. This is the only truly all-black species in Canada. *Hybomitra lanifera* (McDunnough) is most similar but differs in having white hair ventrally on the head and pleural regions of the thorax, gray pruinose subcallus, and brown palpus. Males of these two species are more similar, but the relative glossiness of the gena of *H. procyon* and the palpal color (black in *H. procyon* and dark brown in *H. lanifera*) differentiate the two species.

Philip (1936*b*) observed that this species was never abundant and prefers the semisheltered, high mountain canyons and draws.

Distribution. South-central British Columbia (Map 63) to California and northern Wyoming. The British Columbia specimens were collected from late April to early June.

Hybomitra rhombica (Osten Sacken)

Figs. 48, 183; Map 64

Tabanus rhombicus Osten Sacken, 1876:472.
Hybomitra rhombica: Philip, 1947:297.

Female. Length 13–16 mm. Eye densely short pilose, with 4 green bands on dark purplish background. Frons gray pruinose, with mainly black hair but usually some yellow hair below, 2.7–3.7 times as tall as basal width. Basal callus reaching eye margin; median callus elliptical, often narrowly connected to basal callus. Entire vertex moderately swollen, rather than ocellar tubercle alone; vertex with irregular denuded area medially. Subcallus denuded. Antenna predominantly orange; usually only apical flagellomeres and dorsal margin of basal flagellomere black; basal flagellomere nearly twice as long as broad, with almost no dorsal angle or excavation. Clypeus and gena whitish pruinose, white-haired; upper margin of genae with a few black hairs. Second palpomere creamy white, 3.0–3.5 times as long as greatest width, with black hair, if any, restricted to apical half (Fig. 48).

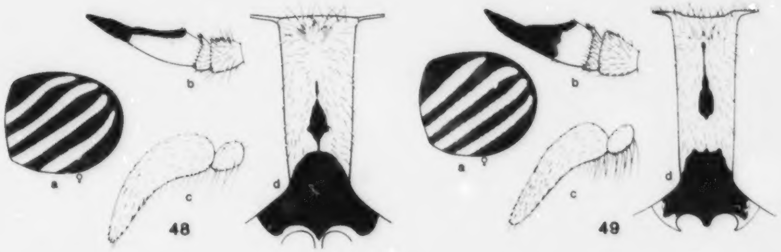
Thorax with relatively prominent grayish longitudinal stripes dorsally; notopleural lobe black; pleura dominantly to exclusively white-haired. Legs mainly reddish brown; coxae, femora, apex of fore tibia, and fore tarsus black; wing membrane essentially clear, with only faint coloring on crossveins and furcation of R_{4+5}.

Abdomen black; median and sublateral patches triangular gray pruinose, white-haired, and almost crossing tergites 2 and 3; tergites with lateral and posterolateral margins also grayish pruinose and white-haired (Fig. 183). Sternites grayish pruinose with posterior margins narrowly paler; sternites completely white-haired, except for a few black hairs medially on terminal 2 or 3 sternites.

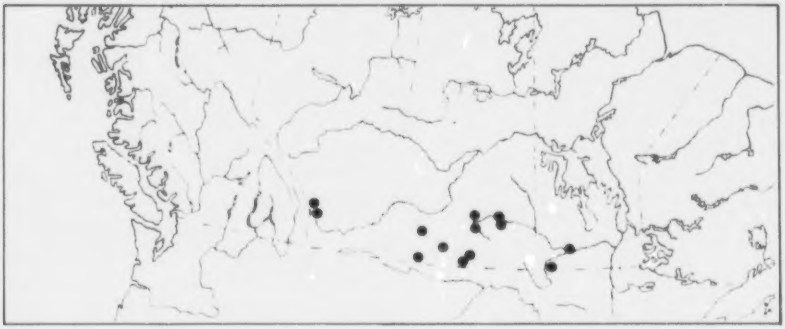
Male. Similar to female except as follows: Eyes with upper median ommatidia slightly larger but not sharply differentiated from lower smaller ommatidia. Subcallus pruinose. Antenna predominantly black. Palpus short oval, yellow, slightly less than 1.5 times as long as diameter. Abdomen with orange tinge laterally on tergite 2 and to lesser extent on tergite 3; median and sublateral pale spots indistinct. Sternites with posterior margins white-haired, predominantly black-haired elsewhere.

Remarks. This species could be confused only with *H. osburni* (Hine). Refer to that species for further comments and for the most useful means of distinction.

Distribution. The Canadian distribution of this species is shown on Map 64. Because of past problems in differentiation from *H. osburni*, the distribution in the United States cannot be satisfactorily defined. The flight period extends from mid July to the end of August.



Figs. 48, 49. Head features of *Hybomitra rhombica* (48) and *H. rupestris* (49).



Map 64. Collection localities of *Hybomitra rhombica*.

Hybomitra rupestris (McDunnough)

Fig. 49; Map 65

Tabanus rupestris McDunnough, 1921:143.
Hybomitra rupestris: Philip, 1947:297.

Female. Length 13–16 mm. Eye densely short pilose, with 4 greenish bands on dark background. Frons 3.0–3.5 times as tall as basal width, moderately widened above; ocellar tubercle little elevated, with any associated glossy integument normally including oblique side patches; median callus usually with slender glossy extension to ocellar tubercle and often with ventral line to basal callus; basal callus usually higher than wide, sometimes reaching eye margin. Subcallus almost or completely glossy black or dark brown, sparsely haired laterally. Scape, pedicel, and base of basal flagellomere orange; flagellomere relatively slender, with obtuse dorsal angle and little or no dorsal excavation. Gena white-haired ventrally, usually dominantly black-haired dorsally. Second palpomere pale yellow brown, 3.0–3.4 times as long as broad, with black and white hair, the former often restricted to apical portion (Fig. 49).

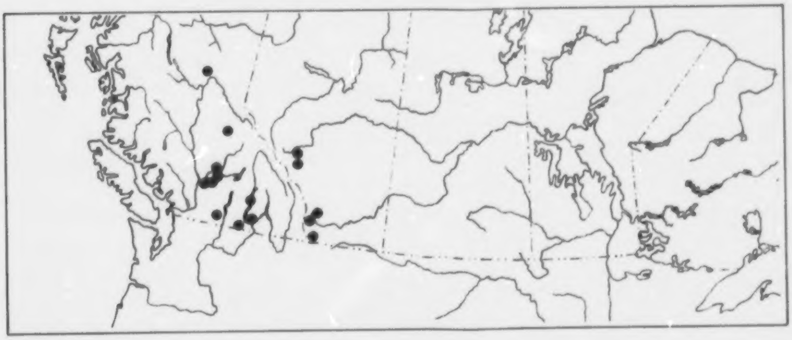
Thorax with faint scutal striping; notopleural lobe black. Coxae and femora black; base of fore tibia, mid and hind tibiae, and tarsi orange brown; tibiae dominantly black-haired. Costal cell, margins of crossveins, and bifurcation of R_{4+5} faintly pigmented.

Abdominal tergites 1 to 3 or 4 orange laterally; tergite 1 with orange sometimes crossing to meet metepimeron; tergites 2 and 3 with median black markings of nearly equal width; tergites 2 to 4 or 5 with overriding paler pruinose median triangles bearing whitish hair; tergites 2 and 3 with sublateral medially skewed pale-haired triangles. Sternites 1 to 4 or 5 dominantly orange, with pale hair; remaining sternites black, with black hair medially.

Male. Similar to female except as follows: generally darker and shinier, with more abundant and longer black hair, especially on genae; eye with upper median ommatidia only slightly enlarged.

Remarks: *Hybomitra rupestris* was recently shown to be a complex of two species (Teskey, Shemanchuk, and Weintraub 1988). *Hybomitra agora* is the name given to the other species. The two can be readily differentiated by the characters given in the key.

Distribution. This species occurs from southern montane areas of British Columbia and Alberta (Map 65) to Colorado, Utah, and northern California. The flight period of *H. rupestris* extends from early July to mid August.



Map 65. Collection localities of *Hybomitra rupestris*.

Hybomitra sexfasciata (Hine)

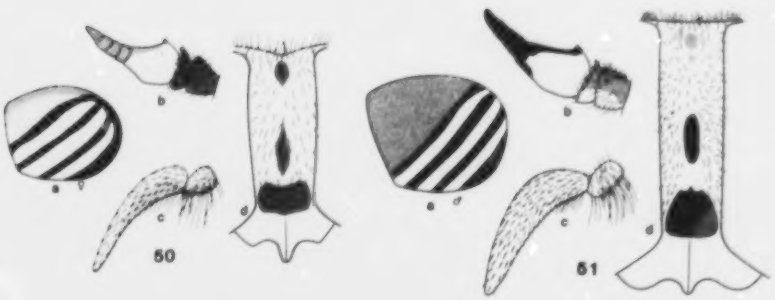
Figs. 50, 175; Map 66

Tabanus sexfasciatus Hine, 1923:144.
Hybomitra sexfasciatus: Philip, 1947:298.

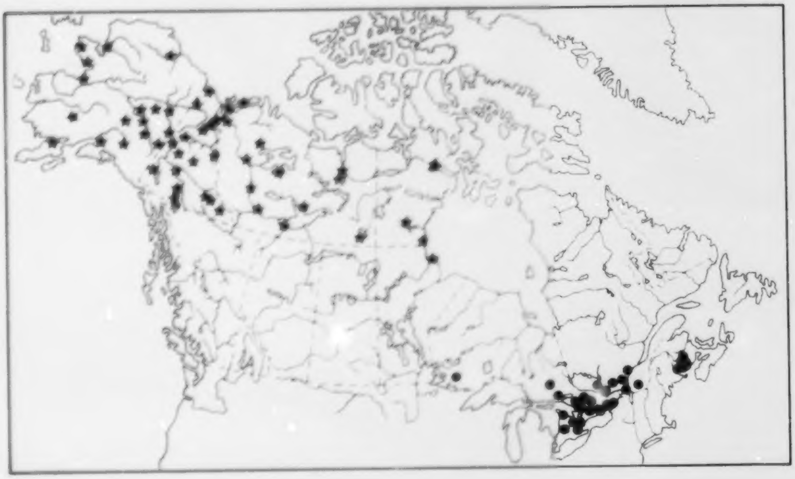
Female. Length 11–13 mm. Eye densely short pilose, with 4 rather broad greenish blue bands on a dark purplish background. Frons 2.5–3.0 times as tall as basal width, slightly widened above, grayish pruinose, with prominent orange denuded ocellar tubercle; basal callus reddish orange, the subquadrate not quite reaching the eye margin; median callus black, lenticular. Subcallus pruinose. Clypeus and gena gray pruinose, with some black hair on upper margin of gena. Antenna with scape and pedicel black; flagellum orange, or with apical flagellomeres and distal part of basal flagellomere more or less blackened; basal flagellomere with obtuse dorsal angle and shallow excavation. Second palpomere four to five times as long as greatest width, light brown, black-haired (Fig. 50).

Thorax black; scutum with usual faint longitudinal stripes. Legs predominantly black; tibiae more or less reddish orange basally. Wing with costal cell and margins of veins in base of wing pigmented.

Abdomen predominantly subglossy black; posterolateral margin of tergite 1 and lateral quarter of tergite 2 with sides reddish tinged; tergites with hind margins narrowly grayish white pruinose, with white to pale yellow hairs; posterior pale-haired margins slightly widened medially, and to lesser extent sublaterally, into triangles that may be faintly visible to the naked eye; tergites black-haired elsewhere (Fig. 175). Sternites mainly white-haired, with similar pale marginal pruinosity; posterior sternites with median black hairs.



Figs. 50, 51. Head features of *Hybomitra sexfasciata* (50) and *H. sodalis* (51).



Map 66. Collection localities of *Hybomitra sexfasciata* (★) and *H. sodalis* (●).

Male. Similar to female except as follows: Hairs of head, thorax, and premarginal areas of abdominal sternites more dominantly black; second palpomere cylindrical and tapered to short point.

Remarks. This species, with its banded abdomen, is a miniature of *H. zonalis* (Kirby) but has white pruinosity, white hairs instead of yellow, and the posttibial fringe black rather than yellow.

Distribution: With collection localities extending from Churchill, Man., to the Mackenzie River Delta and the Seward Peninsula of Alaska (Map 66), this is among the most northerly distributed of any species. Collections have been made from mid June to early August.

Hybomitra sodalis (Williston)

Fig. 51, 178; Map 66

Tabanus sodalis Williston, 1887:139.
Tabanus aestivalis Harris, in Johnson, 1925:70.
Hybomitra trispila ssp. *sodalis* Pechuman, 1960:798.
Hybomitra sodalis: Pechuman, 1981:25.

Female. Length 13–17 mm. Eye with sparse microscopic pubescence and 4 rather narrow greenish blue stripes on dark background. Frons grayish pruinose, with mixed black and yellowish hair, three to four times as tall as basal width, only occasionally slightly widened above; ocellar tubercle distinct, denuded only over vestigial ocelli; median callus oval; basal callus nearly reaching eye margin. Subcallus pruinose. Antenna usually with portions of scape, pedicel, and at least half of basal flagellomere reddish orange; basal flagellomere with dorsal angle nearly 90° and moderate dorsal excavation. Second palpomere yellowish, three to four times as long as greatest width, with mixed black and pale hair (Fig. 51).

Thorax with notopleural lobe reddish. Legs predominantly black; tibiae with reddish tinge, especially basally. Wing moderately pigmented.

Abdomen predominantly black; tergites 2–4 with white hair laterally and with contrasting median white pruinose white-haired triangles (Fig. 178). Sternites with lateral third and narrow posterior margins grayish pruinose and white-haired; median stripe black, black-haired, the contrast most evident in certain conditions of reflected light.

Male. Like female except as follows: Eyes densely short, white pilose, with little difference in ommatidia size. Antenna more slender; basal flagellomere about width of scape; palpus oval. Abdomen dorsally with lateral reddish tinge, strongest on tergites 2 and 3; tergites 2–4 with smaller median whitish triangles crossing tergites; lateral margins of tergites completely black-haired. Sternites with some lateral iridescent grayish pruinosity but with mainly black hair; only posterior margins with white hair.

Remarks. This is among the most easily recognized of horse flies, with its black coloration broken only by the distinctive median white triangles on abdominal tergites 2–4. It is commonly collected, but rarely in abundance, and is seldom a pest. Pechuman (1981) noted that both sexes commonly visit flowers, especially those of *Ceanothus americanus* L. and *Spiraea latifolia* (Ait.) Borkh.

Larvae have been collected in almost all types of wetlands, except those associated with flowing water, and are particularly common in moss in woodland swamps (Teskey 1969).

Distribution. The Canadian distribution of this species is largely confined to eastern Ontario and adjacent southwestern Quebec (Map 66). The New Brunswick records are from a sparse population. South of Canada, *H. sodalis* is present in states east of Minnesota and Illinois and south along the Appalachians to northern Georgia. The flight period in Canada extends from late June to early August.

Hybomitra sonomensis (Osten Sacken)

Fig. 52; Map 67

Tabanus sonomensis Osten Sacken, 1877:216.
Tabanus maculifer Bigot, 1892:641.
Hybomitra sonomensis: Philip, 1947:298.

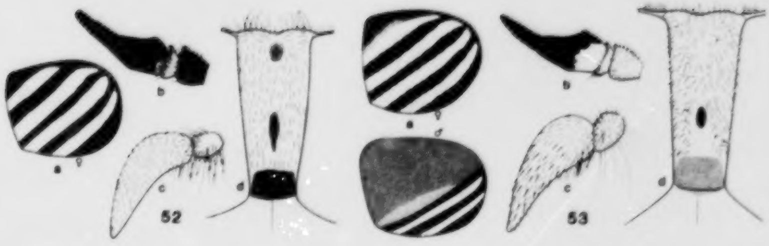
Female. Length 12–15 mm. Eye densely pilose, with 4 greenish blue bands on dark purplish background. Frons 3.3–3.8 times as tall as basal width, widened above; vertex with denudation restricted to ocellar tubercle; median callus usually narrow, small, and isolated; basal callus subquadrate or rounded above, touching eye. Subcallus pruinose. Antenna black to dark brown, with black hair; basal flagellomere relatively slender, with weak dorsal angle and slight excavation. Clypeus and gena gray pruinose, with mostly white hair and some black hair dorsally on gena. Second palpomere creamy white, 2.6–3.0 times as long as greatest width, with evenly mixed black and white hair (Fig. 52).

Thorax with usual faint longitudinal stripes dorsally; median stripe with central brownish line; notopleural lobe yellowish orange to occasionally black. Legs mostly black; base of fore tibia, all of mid and hind tibiae, and portions of tarsi yellowish orange. Wing with costal cell, margins of basal veins, crossveins, and fork of R_{4+5} pigmented; fork of R_{4+5} often with short spur vein.

Abdomen with sides of tergites 1–4 broadly orange laterally, with median black stripe narrowed to tergite 3; tergites dominantly black-haired; posterior margins white-haired, medially extending to middle of tergites. Sternite 1, a median patch on sternite 2, and most of sternites 5–7 black; remaining sternites orange, dominantly yellow-haired, with sparse black hair medially.

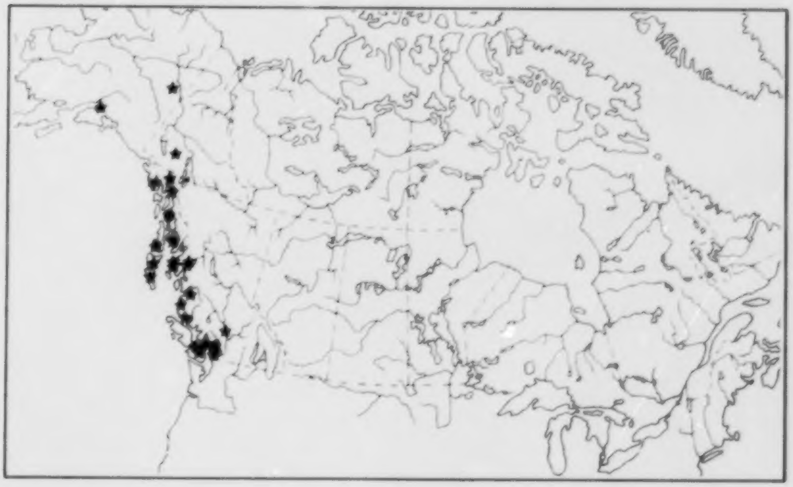
Male: Similar to female except as follows: Eye bluish black with 2 green stripes in lower portion; upper ommatidia 1.5 times as large as ventral ommatidia, but two areas not sharply differentiated. Notopleural lobe black with, at most, faint reddish tinge. Abdomen glossier, with only posteromedian and posterolateral marginal white hairs; white hairs absent laterally; posteromedian hairs not expanded into triangular patches. Sternites black-haired, except on posterior margins.

Remarks. Considerable confusion has been associated with the identification of this species. Much of it was cleared away with Teskey's (1982) recognition of a very similar species, *H. enigmatica*, with which *H. sonomensis* had been confused and which, by occupying an adjacent inland territory, had masked the unique salt marsh breeding habitat of *H. sonomensis*. This was discovered by Lane (1979), who described the immature stages.



Figs. 52, 53. Head features of *Hybomitra sonomensis* (52) and *H. tetrica* (53).

Distribution. *Hybomitra sonomensis* occurs along the Pacific Coast, from Alaska to the San Francisco Bay area (Map 67). It flies from late June to early August in British Columbia.



Map 67. Collection localities of *Hybomitra sonomensis*.

Hybomitra tetrica (Marten)

Fig. 53; Map 68

Therioplectes tetrica Marten, 1883:111.

Tabanus tetrica var. *hirtula* (Bigot), 1892:641 (*Therioplectes*; as sp.).

Tylostypia laticornis Enderlein, 1925*a*:64 (preocc. Hine, 1904).

Hybomitra tetrica: Philip, 1947:299.

Female. Length 13–16 mm. Eye densely short pilose, with 4 greenish blue stripes on dark background. Frons gray pruinose, sometimes tinged with yellow, 3.3–3.8 times as tall as basal width, moderately widened above; ocellar tubercle small, with associated denudation not extending beyond tubercle; median callus black, usually small, oval, and isolated; basal callus sometimes reaching eye margin, usually yellow to brown. Subcallus often narrowly denuded along border with basal callus and sometimes almost completely denuded. Antenna with scape and pedicel often orange brown, sometimes black; basal flagellomere predominantly black, with obtuse dorsal angle and shallow dorsal excavation. Clypeus and gena gray, with mostly white hair. Second palpomere creamy white, strongly swollen basally (length–width index 2.3–2.8), sharply pointed apically, usually with mostly white hairs basally (Fig. 53).

Thorax mainly black; scutum with usual faintly grayer longitudinal stripes; notopleural lobe yellowish brown. Legs usually black; basal half of fore tibia and all of mid and hind tibiae orange brown. Wing membrane, including costal cell, clear; R_{4+5} with bifurcation having prominent spur vein.

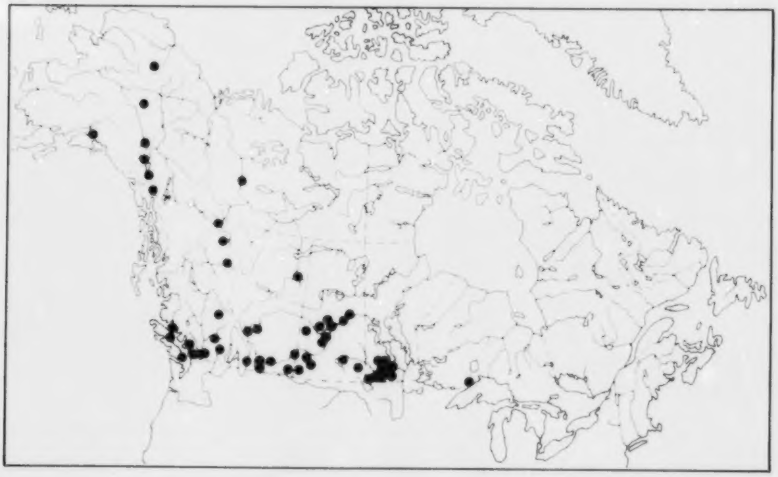
Abdomen usually dominantly black dorsally, but sometimes brownish or brown only laterally; median or sublateral patches (or both) grayish pruinose, white-haired; median patches sometimes obsolete, never reaching more than half the length of tergites and smaller than oblique sublateral patches. Sternites grayish black, predominantly white-haired; anterior segments usually with some orange brown or extensively orange brown.

Male. Differs from female as follows: Eye more densely pale pilose, with areas of large and small ommatidia not sharply differentiated, but lower margin of upper larger ommatidia sometimes having a paler transverse line. Basal flagellomere narrower, less than width of scape; scape black. Second palpomere oval. Abdomen broadly yellowish brown laterally; sublateral paler patches reduced in intensity and median pale patches often very faint.

Remarks. Two varieties of this species have been described: *H. hirtula* (Bigot), in which the subcallus is gray pruinose as opposed to the partly or completely denuded glossy condition in the typical form, and *H. rubrilata* (Philip), with the sides of the abdominal tergites strongly orange brown. Only the former is found in Canada, the latter occurring from Wyoming to New Mexico and Arizona. The variety *H. hirtula* differs from the typical *H. tetrica* in having the subcallus entirely pruinose as opposed to the partial or completely denuded glossy condition in the typical form. There seems to be no regional preponderance for either of these variations, and they are completely integrated. Thus, there is no strong reason for continuing the formal recognition of *H.* var. *hirtulus*.

Hybomitra tetrica is most similar to *H. frontalis* (Walker) and *H. opaca* (Coquillett), differing from both basically only in the presence of the strong spur vein. *Hybomitra frontalis* sometimes has a short spur vein, but the more swollen palps and more divergent frons of *H. tetrica* usually provide further grounds for differentiation. There are no very useful secondary features for separating *H. tetrica* from *H. opacus*, which brings in question the validity of the latter. There is great need of a taxonomic review of this species group.

Distribution. The species is present in all the western provinces, the Yukon, and the Northwest Territories (Map 68) and extends south to California and New Mexico. Canadian collections have been made from late May to mid August, the earlier dates being from Vancouver Island. Most collections are in late June and July.



Map 68. Collection localities of *Hybomitra tetrica*.

Hybomitra trepida (McDunnough)

Figs. 54, 195; Map 69

Tabanus trepidus McDunnough, 1921:142.
Hybomitra trepida: Philip, 1947:299.

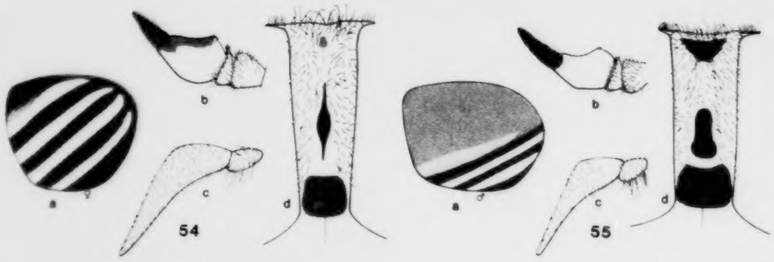
Female. Length 12–16 mm. Eye with sparse minute hairs and 4 greenish blue bands on dark background. Frons grayish pruinose, tinged with brown, 3.2–3.9 times as long as basal width, moderately widened above; vertex with denudation restricted to ocellar tubercle; median callus black, usually more or less spindle-shaped; basal callus orange to reddish brown, occasionally nearly black, separated from eye margin. Subcallus, clypeus, and gena pruinose; clypeus and gena with white hair. Antenna with scape pedicel and much of basal flagellomere orange; terminal flagellomeres darker brown; basal flagellomere moderately broadened, with obtuse dorsal angle and at most a shallow excavation. Second palpomere light brown, slender, 4.5–4.8 times as long as greatest width, abruptly angled dorsally and sharply pointed apically, with a mixture of black and white short hairs (Fig. 54).

Thorax dark, with reddish notopleural lobes and usual faint scutal striping. Legs mainly black; base of fore tibia and all of mid and hind tibia reddish orange. Wing with costal cell, margins of basal veins, and sometimes bifurcation of R_{4+5} lightly pigmented.

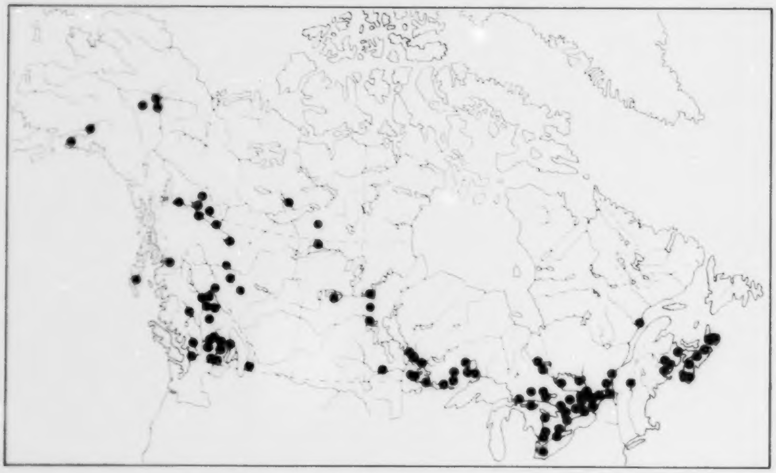
Abdominal tergites with first 4 or 5 segments broadly reddish orange laterally, with narrow median black stripe tapered to tergite 3; tergites with posterior margins having median and sublateral patches of white hair (Fig. 195); tergites with median spots smaller and often less distinct than sublateral oblique spots. Sternites predominantly orange brown and pale-haired.

Male. Differing from female as follows: Eyes densely pale pubescent; enlarged ommatidia with upper area sharply differentiated from smaller lower ommatidia; larger ommatidia about 1.7 times as large as smaller one. Second palpomere brown, oval, nearly twice as long as greatest width. Outer fore tarsal claw about 1.5 times as long as inner claw. Head, thorax, and abdomen more extensively black-haired. Legs completely black-haired. Abdominal tergites 2 and 3 with pale hairs on median and lateral posterior margins only, not extending on disc of segments sublaterally. Sternites mostly black-haired.

Remarks. *Hybomitra trepida* is relatively common in southern forested areas of Canada. It is seldom present in large numbers and thus is rarely a pest. It is readily distinguished from other similar-sized, orange-sided species by its slender palpus. Its larvae have been found in sphagnum bogs and wet, mossy bog-like areas in coniferous forests (Teskey 1969).



Figs. 54, 55. Head features of *Hybomitra trepida* (54) and *H. typhus* (55).



Map 69. Collection localities of *Hybomitra trepida*.

Distribution. The species has been collected most commonly along the southern part of Canada, except the treeless prairie regions, with a sparse northern extension into the Northwest Territories, Yukon Territory, and Alaska (Map 69).

The species has been reported in Idaho and Montana, and in the eastern United States it extends south to West Virginia and New

Jersey. Collection dates range from early June to late August in Canada.

Hybomitra typhus (Whitney)

Figs. 55, 171; Map 70

Tabanus typhus Whitney, 1904:206.
Hybomitra typha: Philip, 1947:299.

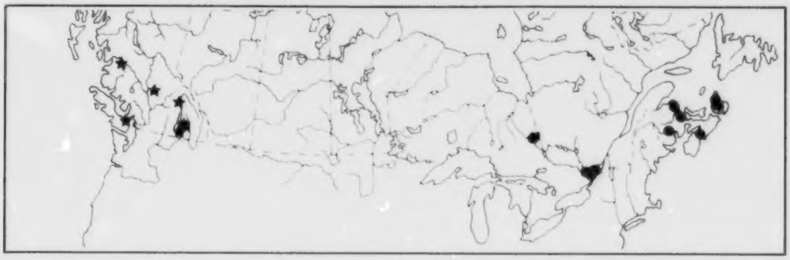
Female. Length 11–14 mm. Eye with sparse minute hairs and 4 greenish blue bands on dark background. Frons grayish brown pruinose, about three times as tall as basal width, slightly widened above; ocellar tubercle usually surrounded by extensive yellowish orange denuded integument; median and basal calli usually similarly colored, although former sometimes black. Antenna mainly yellow; terminal flagellomeres black; basal flagellomere with distinct dorsal angle and shallow dorsal excavation. Clypeus and genae completely white-haired. Second palpomere yellowish orange, about four times as long as greatest width, with relatively sharp dorsobasal angle and sharply pointed apically (Fig. 55).

Thorax with very faint longitudinal scutal stripes; notopleural lobe yellowish brown; pleura completely white-haired. Legs with coxae and femora mostly black; tibiae and tarsi mostly yellowish brown. Wing hyaline, except for light pigmentation of costal cell.

Abdomen dominantly black dorsally; tergite 1 with sides narrowly gray; all tergites with posterior margins narrowly gray; tergites 2–4 with oblique sublateral patches; sublateral patches yellowish orange to gray, white-haired, extending from gray borders; median patches narrow, white-haired, sometimes associated with slight expansion of gray border (Fig. 171). Sternites predominantly yellowish orange, with white hair; sternite 1 and 5–7 often blackened.

Male. Similar to female especially in hair coloring. Eye densely haired; large and small ommatidia distinctly outlined. Abdomen with lateral third of tergites 2–4 orange brown, overlaid with oblique white-haired patches.

Remarks. Reference to *H. typhus* in the literature before 1979 probably refers to *H. pechumani* Teskey & Thomas, a much more common, closely related species with which it was confused. Pechuman (1960, 1962) first recognized the existence of this species, which was later named by Teskey and Thomas (1979), who noted in detail the differences between the two, both in larval and adult features. Little is known of the adult habits of *H. typhus*. Larvae have been found only in moss of a typical sphagnum bog in an advanced stage of its evolution.



Map 70. Collection localities of *Hybomitra typhus* (●) and *H. zygota* (★).

In addition to characters given in the key for the distinction of this species from *H. pechumani*, the following differences are quite useful to note: the relative length of the apical flagellomeres, greater than 0.55 mm in *H. typhus* and less than 0.55 mm in *H. pechumani*; in *H. typhus* the yellow to orange ground color of the basal callus, subcallus, gena, clypeus, and dorsal sclerites of the thoracic pleuron compared with the dark brown to black color of these areas in *H. pechumani*.

Distribution. *Hybomitra typhus* has been found in only seven localities in eastern Canada (Map 70) and in about the same frequency south to South Carolina along the Atlantic Seaboard. Collection dates range from 10 June to 10 August.

Hybomitra zonalis (Kirby)

Figs. 56, 187; Map 71

Tabanus zonalis Kirby, 1837:314.
Tabanus tarandi Walker, 1848:156.
Tabanus terraenovae Macquart, 1850:339.
Tabanus flavocinctus Bellardi, 1859:61.
Hybomitra zonalis: Philip, 1947:300.

Female. Length 14–18 mm. Eye sparsely short-haired, bluish purple, with 3 transverse green bands and an indefinite fourth band subdorsally. Frons brownish gray pruinose, 3.0–3.5 times as tall as basal width, usually moderately widened above; vertex with denuded area covering ocellar tubercle and extending to eye margin; vertex usually with narrow lines, one connected to median callus and two extending obliquely downward to eye margin on either side of median callus; basal callus subquadrate, shiny black to reddish, narrowly connected to slender median callus. Subcallus pruinose. Antenna with scape and pedicel yellow and black-haired; basal flagellomere mostly orange, slightly longer than wide, with prominent dorsal and ventral angles and dorsal excavation. Second palpomere reddish brown, 3.5–4.0 times as long as greatest width, evenly tapered, with black hair (Fig. 56).

Thorax mainly black; notopleural lobe orange, predominantly black-haired. Legs mainly black; base of fore tibia and all of mid and hind tibiae and tarsi orange; hind tibial fringe yellow. Wing with costal cell and margins of veins, especially in base of wing, more or less pigmented.

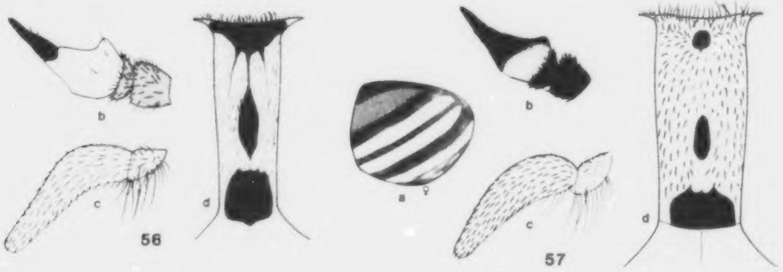
Abdomen dominantly black; tergites and sternites with hind margins yellow (Fig. 187); hairs concolorous with integument where located.

Male. Similar to female except as follows: Eye densely pubescent, with ommatidia of rather uniform size; basal flagellomere more slender; palpus brown to black, suboval; abdominal segments with reddish tinge laterally.

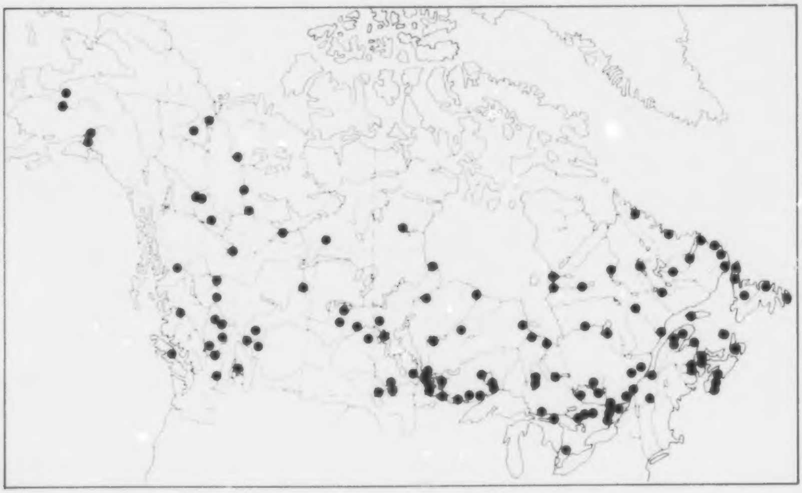
Remarks. This species is quite similar to *H. aequetincta* Becker. Maire and Beaudoin (1984) have compared sympatric populations of the two species from northern Quebec. The most useful differentiating characters are as follows.

	H. zonalis	*H. aequetincta*
Subcallus	pruinose	partly denuded
Ratio of ventral to dorsal width of frons	no more than 1.3	usually more than 1.3
Mid and hind femora	dominantly black	apical third to half yellowish
Palpus	reddish brown	black
Notopleural lobe	usually orange	black
Vertex of frons	glossy black to eye margin	only ocellar tubercle glossy
Hair color on black integument of abdomen	mostly black	extensively white to yellow
Yellow bands on abdomen	wider with sublateral expansion on tergite 2	narrower without expansions

Further evidence of the close relationship of these two species has been discovered by investigators at the University of Quebec at Trois-Rivières, in the form of apparent hybrids of the two species, collected from sites in the James Bay drainage slope in northern Quebec.



Figs. 56, 57. Head features of *Hybomitra zonalis* (56) and *H. zygota* (57).



Map 71. Collection localities of *Hybomitra zonalis*.

Distribution. *Hybomitra zonalis* is a common, widespread, mainly northern species extending transcontinentally to all corners of Canada where the family is to be found (Map 71). It is uncommon in the United States, entering Washington in the west and the western Great Lakes states, New York, the New England States, south to New Jersey. Collections have been made from early June to mid August, with most occurring in early to mid July.

Hybomitra zygota Philip

Fig. 57; Map 70

Tabanus zygotus Philip, 1937*a*:52.
Hybomitra zygota: Philip, 1947:300.

Female. Length 13–17 mm. Eye densely pubescent, dark bluish purple, with 4 green stripes, the upper one much fainter than the others (Fig. 57*a*). Frons brownish gray pruinose, black-haired, 2.6–3.0 times as tall as basal width, slightly wider above than below; basal callus hemispherical, usually brown, nearly width of frons; median callus narrow, oval, often partly joined to basal callus; ocellar tubercle partly denuded. Antenna with scape and pedicel black; basal flagellomere orange basally, black apically, about as broad as long, with distinct dorsal angle; apical flagellomeres black. Second palpomere light brown, black-haired, there to four times as long as greatest width (Fig. 57).

Thorax black, with faint longitudinal paler scutal stripes; notopleural lobe usually black, rarely orange, or with reddish tinge. Legs with coxae, femora, and much of fore tibia black; other tibiae and tarsi brown to reddish; hind tibial fringe black. Wing clear except lightly tinted costal cell.

Abdomen with sides of tergites 1–4 reddish brown; tergite 1 with reddish brown extending anteriorly to metepimeron; abdomen medially with black stripe usually narrowest at posterior of tergite 2; all tergites dominantly black-haired, but with narrow posterior fringe of white hair slightly expanded medially and sublaterally. Sternites 2 to 4 or 5 usually dominantly orange, occasionally as black as other sternites; anterior sternites white-haired, but with sparse black hair medially; terminal sternites black-haired.

Male. Similar to female except as follows: Eye with hairs short, dense, whitish; upper ommatidia slightly enlarged. Antenna dominantly black; basal flagellomere about 2.5 times as long as broad. Abdomen with black tergal stripe narrower; sternites with orange coloration less extensive than on female. Outer fore tarsal claw about one-third longer than inner claw.

Remarks. The dimensions of the frons, basal flagellomere, and second palpomere, as well as the color of the notopleural lobe, readily distinguish this species from *H. affinis* (Kirby), *H. atrobasis* (McDunnough), *H. captonis* (Marten), and *H. fulvilateralis* (Macquart), with which it might be confused.

Distribution. All British Columbia collections have been in mountainous forested terrain (Map 70) and in similar habitats in the remainder of its range in Washington and Oregon, with most localities being in the Cascade Mountains. Collection dates are from 18 July to 10 August.

Genus *Atylotus* Osten Sacken

Length 8–15 mm, most similar to species of *Tabanus*. Eye pilose, usually with single transverse dark stripe often seen in dried specimens; dorsal postocular fringe of hairs often distinct. Frons 2–4 times as tall as basal width, only moderately if at all widened above; dimensions broadly overlapping in all species; most species without denuded shiny frontal calli; calli much narrower than frons when present. Antenna yellowish, uniform; basal flagellomere with obtuse dorsal angle and little or no dorsal excavation. Second palpomere also very uniform, creamy white, moderately swollen basally, tapered apically. Thorax and abdomen dominantly light to dark gray or brown; abdomen often more or less yellowish to orange laterally, with varied pattern of pale and dark hairs or completely pale-haired.

A revision of the North American species based on adults and immature stages has been published recently (Teskey 1983*a*, 1983*b*), with the result that 14 species are now recognized, 12 of which have been found in Canada. The other two species possibly occur here as well.

Key to Species of *Atylotus*

Females

1. Frons with glossy basal and median calli, or only a basal callus, neither more than about half the width of frons 2

   Frons completely pruinose, without calli 7

2. Body hair almost completely white; black hair only on antenna, palpus, notopleural lobe, tibiae, and tarsi. Costal cell concolorous with rest of wing membrane (not collected in Canada) ....
   .... ***utahensis* (Rowe & Knowlton)** (p. 278)

Body hair more extensively black, with black hairs also present on frons and dorsum of thorax and abdomen. Costal cell color variable 3

3. Nearly lateral third of abdominal tergites orange and prominently outlining a median black stripe (Ontario) .... ***woodi*** **Pechuman** (p. 279)

Abdomen not as broadly orange laterally 4

4. Pale hairs on at least scutum and abdomen distinctly yellow ... 5

Pale hairs on all parts of body white to creamy white 6

5. Thoracic pleural hairs yellow. Postocular fringe of hairs long (0.25 mm) and black (British Columbia to Alaska) .... ***tingaureus*** **(Philip)** (p. 277)

Thoracic pleural hairs white. Postocular fringe of hairs relatively short (0.125 mm) and including many white hairs (Ontario) .... ***intermedius*** **(Walker)** (in part) (p. 269)

6. Abdominal coloration in unrubbed specimens grayish as a result of larger median and sublateral white-haired patches on each tergite. Fork of R_{4+5} usually with long spur vein. Apical flagellomeres darker than basal flagellomere (western) .... ***calcar*** **Teskey** (p. 262)

Abdominal coloration dominantly black, with little evidence of median and sublateral paler areas on tergites. Fork of R_{4+5} with no more than short spur vein. Flagellum usually uniformly yellow (western) .... ***insuetus*** **(Osten Sacken)** (p. 267)

7. Pleural hairs bright yellow; basal flagellomere about as broad as long (widespread) .... ***bicolor*** **(Wiedemann)** (p. 305)

Pleural hairs white; basal flagellomere usually longer than broad 8

8. Pale hairs on scutum and abdomen white and concolorous with thoracic pleural hairs 9

Pale hairs of scutum or abdomen, or calypteral hair tuft, at least faintly yellow and contrasting with white thoracic pleural hairs 10

9. Postocular fringe of hairs mostly black (transcontinental) .... ***sublunaticornis*** **(Zetterstedt)** (p. 274)

Postocular fringe of hairs white (not collected in Canada) .... ***ohioensis*** **(Hine)** (p. 270)

10. Scutum and dorsum of abdomen completely pale-haired or with sparse black hairs; palpus and notopleural lobe with sparse black hairs (eastern) .... ***thoracicus*** **(Hine)** (p. 276)

Scutum, dorsum of abdomen, palpus, and notopleural lobe with prominent black hair. 11

11. Costal and humeral cells hyaline; notopleural lobe yellow; postocular fringe usually extensively yellow (widespread) . . . . ***hyalicosta*** **Teskey** (p. 265)

Costal and humeral cells tinted and contrasting with hyaline membrane elsewhere; postocular fringe usually predominantly black 12

12. Abdominal tergites 2–4 entirely black-haired medially, with at most caudal fringe of yellow hairs. Upper surface of veins R_1, Sc, and C with yellow setae (eastern) . . . . . . ***duplex*** **(Walker)** (p. 264)

Abdominal tergites 2–4 with yellow hair medially, either generally mixed with black hair or forming rather distinctive patches of dominant yellow hair. Upper surface of anterior wing veins usually with predominantly black setae 13

13. Abdominal tergites 2 to 4 or 5 with discrete median triangles of bright yellow hairs based posteriorly; median pale triangles flanked on either side by anterior patches of exclusively black hair, the pattern visible to the naked eye (eastern) . . . . ***palus*** **Teskey** (p. 271)

Abdominal tergites with pale hairs not bright yellow and not arranged in distinct median triangles, but rather generally mixed with black hairs medially 14

14. Length 12 mm or more (Ontario) . . . . ***intermedius*** **(Walker)** (in part) (p. 269)

Length rarely more than 11 mm (eastern) . . . . ***sphagnicolus*** **Teskey** (p. 272)

Key to Species of *Atylotus*

Males

1. Postocular fringe of hairs short, a little (if at all) longer than eye hairs 2

Postocular fringe of hairs much longer than eye hairs 5

2. Body hair, especially on abdomen, almost completely white; sparse black hair only on antenna, palpus, notopleural lobe, scutum, tibia, and tarsus (not collected in Canada) . . . . ***utahensis*** **(Rowe & Knowlton)** (p. 278)

Pale body hair not necessarily white, and black hairs more abundant and also present on frons and abdominal tergites 3

3. First 6 abdominal tergites with lateral third orange, with orange providing sharp margin to median black stripe. Legs almost entirely orange (Ontario) .... ***woodi*** **Pechuman** (p. 279)

   Abdomen with orange markings on sides much less extensive or in the form of sublateral spots, especially on tergites 3 and 4, usually not sharply outlining median black area. Femora extensively blackened 4

4. Fork of R_{4+5} with long spur vein. Terminal flagellomeres black and contrasting with orange basal flagellomere (western) .... ***calcar*** **Teskey** (p. 262)

   Fork of R_{4+5} with at most very short spur vein, but spur usually lacking. Terminal and basal flagellomeres usually concolorous (western) .... ***insuetus*** **(Osten Sacken)** (p. 267)

5. Thoracic pleural hairs at least partly yellow 6

   Thoracic pleural hairs completely white 9

6. Almost all body hair yellow, including wing setae and postocular fringe (widespread) .... ***bicolor*** **(Wiedemann)** (p. 260)

   Postocular fringe with abundant black hair mixed with pale hair on scutum and abdominal tergites 7

7. All pleural hair more or less yellow; abdominal tergites with sides at most very narrowly orange. (British Columbia to Alaska) .... ***tingaureus*** **(Philip)** (p. 277)

   Only those hairs on metanepisternum and sometimes laterotergite yellow, remainder white; tergites 1–3 about one-quarter orange laterally. Eastern species 8

8. Antenna with flagellum about four times as long as greatest width of basal flagellomere; basal flagellomere with distinct dorsal excision. Eye hairs about 0.125 mm long. Length of body 12–13 mm (Ontario) .... ***intermedius*** **(Walker)** (p. 269)

   Antenna with flagellum about three times as long as greatest width of basal flagellomere; basal flagellomere without dorsal excision. Eye hairs about 0.08 mm. long. Length of body 10–11 mm (eastern) .... ***palus*** **Teskey** (p. 271)

9. Body with all pale hair white and concolorous with thoracic pleural hair 10

   Scutum and abdomen with pale hair yellowish and contrasting with white thoracic pleural hair 11

10. Body with almost all hair white; black hair restricted to legs, notopleural lobe, and palpus (not collected in Canada) .... ***ohioensis*** **(Hine)** (p. 270)

Body with most areas having abundant black hair (transcontinental) .... ***sublunaticornis*** **(Zetterstedt)** (p. 274)

11. Postocular fringe of hairs predominantly yellow 12

Postocular fringe of hairs predominantly black 13

12. Costal, humeral, and stem cells hyaline. Notopleural lobe yellow or paler than scutum. Wing veins C and R_1 with abundant black setae (widespread). .... ***hyalicosta*** **Teskey** (p. 265)

Costal, humeral, and stem cells infuscated. Notopleural lobe as dark as scutum. Wing veins C and R_1 with only yellow setae posteriorly .... ***duplex*** **(Walker)** (p. 264)

13. Yellow hair dominant on scutum and dorsally on abdomen; black hair inconspicuous on these areas and also relatively sparse on notopleural lobe and palpus (eastern) .... ***thoracicus*** **(Hine)** (p. 276)

Black hair abundant on palpus, scutum, notopleural lobe, and dorsally on abdomen (eastern) .... ***sphagnicolus*** **Teskey** (p. 272)

Tableau d'identification des espèces du genre *Atylotus*

Femelles

1. Calus inférieur et médian ou calus inférieur seulement lustré, aucun n'ayant plus de la moitié de la largeur du front 2

Front tout pruineux, sans calus 7

2. Pilosité du corps presque toute blanche; noire seulement sur l'antenne, le palpe, le lobe du notopleurite, le tibia et le tarse. Cellule costale de même couleur que le reste de la membrane alaire (espèce non capturée au Canada) .... ***utahensis*** **(Rowe & Knowlton)** (p. 278)

Pilosité noire du corps plus étendue : aussi présente sur le front, le dos du thorax, celui de l'abdomen. Cellule costale de coloration variable 3

3. Le tiers quasi latéral des tergites d'un orange faisant éminemment ressortir une rayure médiane noire (Ontario) .... ***woodi*** **Pechuman** (p. 279)

Abdomen sur les côtés duquel la couleur orange prend moins de place 4

4. Poils pâles du scutum et de l'abdomen, au moins, nettement jaunes 5

Poils pâles de toutes les parties du corps blancs à blanc crème 6

5. Poils des pleurites thoraciques jaunes. Poils de la frange postoculaire longs (0,25 mm) et noirs (de la Colombie-Britannique à l'Alaska) .... ***tingaureus*** **(Philip)** (p. 277)

Poils des pleurites thoraciques blancs. Poils de la frange postoculaire relativement courts (0,125 mm) et comprenant de nombreux poils blancs (Ontario) .... ***intermedius*** **(Walker)** (*partim*) (p. 269)

6. Coloration abdominale des spécimens non frottés grisâtre en raison de la présence de plages médianes et sublatérales plus étendues de poils blancs sur chaque tergite. Bifurcation de R_{4+5} comportant habituellement une longue nervure acuminée. Articles apicaux du flagelle plus foncés que l'article basal (Ouest) .... ***calcar*** **Teskey** (p. 262)

Coloration abdominale surtout noire; présence très discrète de zones médianes et sublatérales pâles sur les tergites. Bifurcation de R_{4+5} comportant au plus une courte nervure acuminée. Flagelle habituellement d'un jaune uniforme (Ouest) .... ***insuetus*** **(Osten Sacken)** (p. 267)

7. Poils des pleurites jaune vif; article basal du flagelle à peu près aussi large que long (espèce répandue) .... ***bicolor*** **(Wiedemann)** (p. 305)

Poils des pleurites blancs; article basal du flagelle habituellement plus long que large 8

8. Pilosité pâle du scutum et de l'abdomen blanche et de la même couleur que celle des pleurites thoraciques 9

Pilosité pâle du scutum ou de l'abdomen ou touffe de poils du cuilleron au moins jaune pâle et contrastant avec les poils blancs des pleurites thoraciques 10

9. Poils de la frange postoculaire surtout noirs (d'un bout à l'autre du continent) .... ***sublunaticornis*** **(Zetterstedt)** (p. 274)

Poils de la frange postoculaire blancs (espèce non capturée au Canada) .... ***ohioensis*** **(Hine)** (p. 270)

10. Pilosité du scutum et du dos de l'abdomen toute pâle ou parsemée de poils noirs clairsemés; poils noirs clairsemés sur le palpe et le lobe du notopleurite (Est) .... ***thoracicus*** **(Hine)** (p. 276)

Pilosité du scutum, du dos de l'abdomen, du palpe et du lobe notopleural surtout noire 11

11. Cellules costale et humérale transparentes; lobe du notopleurite jaune; frange postoculaire habituellement en grande partie jaune (espèce répandue) .... ***hyalicosta*** **Teskey** (p. 265)

Cellules costale et humérale teintées et contrastant avec le reste de la membrane transparente; frange postoculaire surtout noire, habituellement 12

12. Pilosité des tergites 2 à 4 toute noire en position médiane, tout au plus la frange caudale étant de poils jaunes. Face supérieure des nervures R_1, Sc et C garnie de soies jaunes (Est) .... ***duplex*** **(Walker)** (p. 264)

Pilosité des tergites 2 à 4 jaune mêlée de noir ou formant des plages dominantes de poils jaunes en position médiane. Face supérieure des nervures alaires antérieures habituellement garnie de soies surtout noires 13

13. Tergites 2 à 4 ou 5 ornés discrètement, en position médiane, de triangles de poils jaune vif pointant dans le sens antérieur; triangles pâles médians flanqués de plages antérieures de poils exclusivement noirs, le motif ainsi formé étant visible à l'oeil nu (Ouest) .... ***palus*** **Teskey** (p. 271)

Tergites comportant des poils pâles, non jaune vif et non disposés en triangles médians distincts, mais plutôt entremêlés, en position médiane, de poils noirs 14

14. Longueur : au moins 12 mm (Ontario) .... ***intermedius*** **(Walker)** (*partim*) (p. 269)

Longueur : rarement plus de 11 mm (Est) .... ***sphagnicolus*** **Teskey** (p. 272)

Tableau d'identification des espèces du genre *Atylotus*

Mâles

1. Poils de la frange postoculaire courts, un peu plus longs (si tant est qu'ils le soient) que les poils oculaires 2

Poils de la frange postoculaire beaucoup plus longs que les poils oculaires 5

2. Pilosité du corps, particulièrement de l'abdomen, presque toute blanche; poils noirs clairsemés uniquement sur l'antenne, le palpe, le lobe du notopleurite, le scutum, le tibia et le tarse

(espèce non capturée au Canada) .... *utahensis* **(Rowe & Knowlton)** (p. 278)

Pilosité pâle du corps pas nécessairement blanche; poils noirs plus abondants et présents aussi sur le front et les tergites 3

3. Tiers latéral des 6 premiers tergites orange, couleur assurant une bordure nette à la rayure médiane noire. Pattes presque tout orange (Ontario) .... *woodi* **Pechuman** (p. 279)

Marques orange de l'abdomen beaucoup moins étendues ou prenant la forme de taches sublatérales, particulièrement sur les tergites 3 et 4 et, habituellement, ne faisant pas ressortir nettement la zone médiane noire. Noir étendu sur les fémurs 4

4. Bifurcation R_{4+5} pourvue d'une longue nervure acuminée. Articles terminaux du flagelle noirs, contrastant avec l'article basal, orange (Ouest) .... *calcar* **Teskey** (p. 262)

Bifurcation R_{4+5} pourvue, au plus, d'une courte nervure acuminée, habituellement manquante toutefois. Articles terminaux et basal du flagelle habituellement de la même couleur (Ouest) .... *insuetus* **(Osten Sacken)** (p. 267)

5. Pilosité des pleurites thoraciques au moins en partie jaune 6

Pilosité des pleurites thoraciques toute blanche 9

6. Poils du corps presque tous jaunes, y compris les soies alaires et la frange postoculaire (espèce répandue) .... *bicolor* **(Wiedemann)** (p. 260)

Frange postoculaire constituée d'abondants poils noirs; ceux-ci mêlés de poils pâles sur le scutum et les tergites 7

7. Tous les poils des pleurites plus ou moins jaunes; côtés des tergites tout au plus à zone orange très étroite (de la Colombie-Britannique à l'Alaska) .... *tingaureus* **(Philip)** (p. 277)

Pilosité du mésanépisternum et, parfois, du latérotergite seule à être jaune, le reste blanc; quart latéral des tergites 1 à 3 orange (espèces de l'Est) 8

8. Flagelle de l'antenne environ 4 fois plus long que la largeur maximale de son article basal; ce dernier nettement excisé dans le plan dorsal. Poils de l'oeil d'environ 0,125 mm de long. Longueur du corps : 12 à 13 mm (Ontario) .... *intermedius* **(Walker)** (p. 269)

Flagelle de l'antenne environ 3 fois plus long que la largeur maximale de son article basal; ce dernier non excisé dans le plan dorsal. Poils de l'oeil d'environ 0,08 mm de long. Longueur du corps : 10 à 11 mm (Est) .... *palus* **Teskey** (p. 271)

9. Pilosité pâle du corps toute blanche, de même couleur que celle des pleurites thoraciques 10

Pilosité pâle du scutum et de l'abdomen jaunâtre, contrastant avec la pilosité blanche des pleurites thoraciques 11

10. Pilosité du corps presque toute blanche; poils noirs confinés sur les pattes, le lobe du notopleurite et le palpe (espèce non capturée au Canada) .... ***ohioensis*** **(Hine)** (p. 270)

Poils noirs abondants sur la plupart des parties du corps (d'un bout à l'autre du continent) .... ***sublunaticornis*** **(Zetterstedt)** (p. 274)

11. Poils de la frange postoculaire surtout jaunes 12

Poils de la frange postoculaire surtout noirs 13

12. Cellules costale, humérale et souche transparentes. Lobe du notopleurite jaune ou plus pâle que le scutum. Nervures alaires C et R_1 garnies d'abondantes soies noires (espèce répandue) .... ***hyalicosta*** **Teskey** (p. 265)

Cellules costale, humérale et souche brunâtres. Lobe du notopleurite aussi foncé que le scutum. Nervures alaires C et R_1 garnies uniquement de soies jaunes en position postérieure .... ***duplex*** **(Walker)** (p. 264)

13. Pilosité jaune prédominant sur le scutum et la face dorsale de l'abdomen; dans ces parties, les poils noirs sont peu remarquables et ils sont aussi relativement clairsemés sur le lobe du notopleurite et le palpe (Est) .... ***thoracicus*** **(Hine)** (p. 276)

Abondante pilosité noire sur le palpe, le scutum, le lobe du notopleurite et sur la face dorsale de l'abdomen (Est) .... ***sphagnicolus*** **Teskey** (p. 272)

Atylotus bicolor (Wiedemann)

Fig. 58; Map 72

Tabanus bicolor Wiedemann, 1821:46.
Tabanus fulvescens Walker, 1848:171.
Tabanus ruficeps Macquart, 1855:55.
Atylotus bicolor: Philip, 1947:288.

Female. Length 8–11 mm. Head mostly yellow-haired; integument predominantly yellow to light brown, pruinose. Frons with black and yellow hair; postocular fringe sometimes with sparse black hair. Antenna yellow; scape and often pedicel with black hair mixed with the yellow. Second palpomere yellow, with yellow and

black hairs. Eye sometimes with partial to nearly complete dark transverse stripe (Fig. 59).

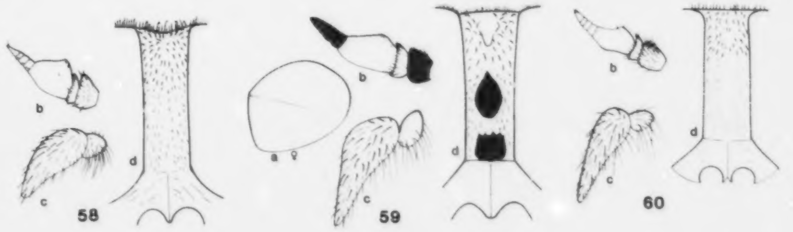
Thorax with scutum mostly dark brown, pruinose; scutum with erect black hair and more recumbent yellow hair; notopleural and postpronotal lobes yellow, the former with yellow and black hair; pleura grayish pruinose with yellow hair. Legs dominantly yellow, mostly yellow-haired. Wing with costal, humeral, and stem cells almost hyaline to distinctly yellowish; anterior wing veins with yellow setae. Halter yellow.

Abdomen dorsally predominantly dark brown; tergites 1 to 3 or 6 distinctly more yellow laterally; tergites with yellow and black hair, the yellow hair uniformly distributed and the black hair confined more to middle of tergites, especially on tergite 2. Sternites mostly yellow, completely yellow-haired.

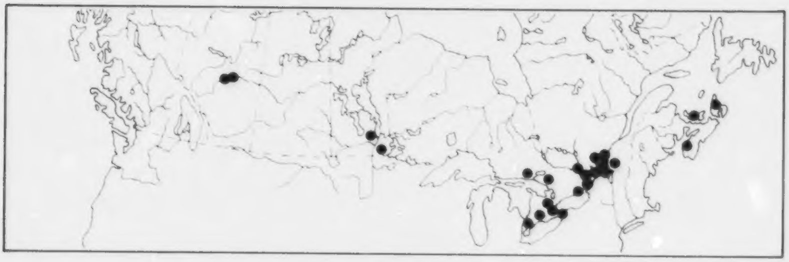
Male. Differs from female as follows: postocular fringe of yellow hairs longer; antenna and palpi frequently without black hair; thorax with long yellow hairs on scutum and with black hairs inconspicuous; legs with yellow hair more dominant on distal segments; abdomen more broadly yellow laterally, with dark brownish median stripe widest anteriorly and usually no more than one-third the width of abdomen.

Remarks. Adults of this species differ from those of other *Atylotus* in having all pale hairs yellow, including those on the pleural surfaces of the thorax.

Larvae have been found in a great variety of habitats, including sphagnum bogs, gravelly soil covered with leaf debris on the margin of a pond, grass sod bordering a temporary pasture pond, boggy pond margins, wooded and open swamps, and vegetation-free soils bordering streams and rivers.



Figs. 58–60. Head features of *Atylotus bicolor* (58), *A. calcar* (59), and *A. sublunaticornis* (60).



Map 72. Collection localities of *Atylotus bicolor*.

Distribution. The species has been collected from Alberta to Nova Scotia (Map 72) and from the northeastern half of the United States to Wyoming. Collection dates range from 11 June to 24 August.

Atylotus calcar Teskey

Fig. 59; Map 73

Atylotus calcar Teskey, 1983:697.

Female. Length 10–13 mm. Predominantly tawny gray. Head gray pruinose, dominantly white-haired, including relatively short postocular fringe. Frons with basal and median calli irregularly shaped, about one-half to two-thirds width of frons. Antenna with basal flagellomere orange and terminal flagellomeres black. Frontoclypeus with narrow denuded glossy area below antennae. Second palpomere creamy white, with black and white hair. Eye sparsely pubescent, with narrow transverse dark stripe (Fig. 60).

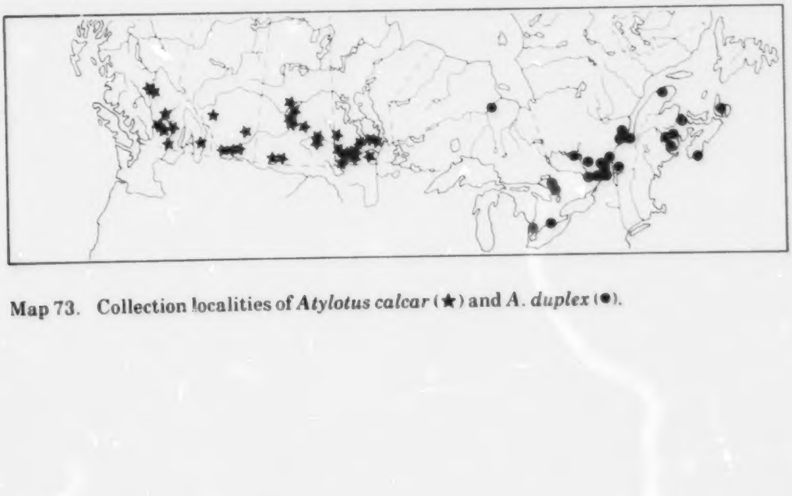
Thorax gray pruinose, mainly white-haired; scutum with darker median and sublateral stripes and with sparse more erect black hair; notopleural lobe yellow. Femora and tarsomeres dominantly black;

tibiae yellow. Wing with costal cell yellow; fork of R_{4+5} with long spur vein.

Abdominal integument with tergites 2 and 3 often more yellowish laterally; all tergites with areas of recumbent black hair outlining median triangular and sublateral oval or oblique white-haired patches, the patches, in crossing the tergites, forming median and sublateral serrate longitudinal stripes.

Male. Similar to female except as follows: eye densely pubescent, with dorsal ommatidia moderately enlarged; body hairs much longer; abdomen more broadly orange sublaterally, sometimes extending to tergite 4, and outlining median dark integumental stripe.

Remarks. This species is most similar to *A. insuetus* (Osten Sacken) and *A. tingaureus* (Philip) and was, until its recent description, recognized under the former name. However, the discovery of the larvae of *A. calcar* and *A. insuetus* living under quite different ecological conditions and showing distinctive morphological features provided the key to the differentiation of the adults (Teskey 1983). The larvae of *A. calcar* were found in wet soil at the margin of a typical alkaline slough, a habitat type that likely could be found near most of the adult collection localities.



Map 73. Collection localities of *Atylotus calcar* (★) and *A. duplex* (●).

Distribution. This species has been collected in all three Prairie Provinces and the central valleys of British Columbia (Map 73) and south to Arizona. Collection dates range from 10 June to 20 August.

Atylotus duplex (Walker)

Map 73

Atylotus pemeticus of some authors, not Johnson.

Tabanus imitans Walker, 1848:173: (Name preoccupied by Walker, 1848:146).

Tabanus duplex Walker, 1854:173 (new name for *imitans* Walker).

Atylotus duplex: Philip, 1942:288.

Female. Length 9–12 mm. Predominantly dark brown to black. Eye very sparsely, short pilose, usually lacking any vestige of a transverse stripe. Postocular fringe of hairs usually extensively black, rarely completely yellow. Frons, subcallus, and upper parts of genae yellow to tawny pruinose; frons lacking frontal calli and with yellow and sparse black hair; sides of subcallus with few hairs; gena and clypeus usually with only pale hairs; underlying integument, except medially on frons, yellow.

Thorax black, with white pruinosity; pleura and coxae with white hairs; scutum and scutellum with faintly brownish pruinosity and with recumbent yellow hair and more erect black hair. Legs mostly orange, with base of mid and hind femora often darkened. Wing with costal, humeral, and usually stem cells tinted; setae dorsally on C, Sc, R_1, and basicosta usually predominantly yellow; calypteral tuft of hairs yellow. Halter yellowish orange.

Abdomen mostly dark brown dorsally; lateral quarter or less of tergites 1 and 2 and narrow lateral margins of remaining tergites yellowish; tergites mostly with concolorous hairs; caudal margins of tergites with fringe of yellow hairs, the hairs medially sometimes encroaching sparsely into middle of tergites; tergite 2 with black hair sometimes extending laterally onto yellow sides. Sternites dark, with grayish pruinosity and mainly yellow hair; caudal segments with a few black hairs.

Male. Showing the greatest difference from the female of any species of the genus. Postocular fringe of long completely yellow hairs; thoracic hair longer, predominantly yellow on scutum, with black hairs most distinct on notopleural lobe; wing with setae on anterior veins completely yellow; abdomen with anterior tergites having lateral half to two-thirds of integument yellow; tergites with predominantly long yellow hair, with black hair rather inconspicuous medially; sternites usually yellowish orange laterally.

Remarks. Females of this species are quite variable, especially in the color of the postocular fringe of hairs, the color of the vein setae, and the occasional presence of a well-developed eye stripe. This variability reduces the characteristics for reliable identification to only the hair color pattern on the abdominal tergites.

Males, on the other hand, are relatively uniform in appearance and are quite different from the females because of their completely yellow postocular fringe and predominantly yellow scutal and abdominal hair. The males are similar to those of *A. hyalicosta* Teskey, differing only in the yellowish costal cell. None have a yellow notopleural lobe, as do most males of *A. hyalicosta*. At the same time, the yellow hairs of the postocular fringe of the male, coupled with the predominantly yellow abdominal tergal hair and the yellow anterior vein setae, clearly negate any possibility of their being the same species.

Teskey (1969) described mature larvae and pupae under the name of *A. pemeticus* (Johnson). These larvae were found in wet moss in woodland swamps and spring-fed drainage beds.

Distribution. This species has been collected from Ontario to Nova Scotia (Map 73), south to Tennessee and South Carolina. Canadian collections have been made from 9 June to 24 August.

Atylotus hyalicosta Teskey

Map 74

Atylotus hyalicosta Teskey, 1983:30.

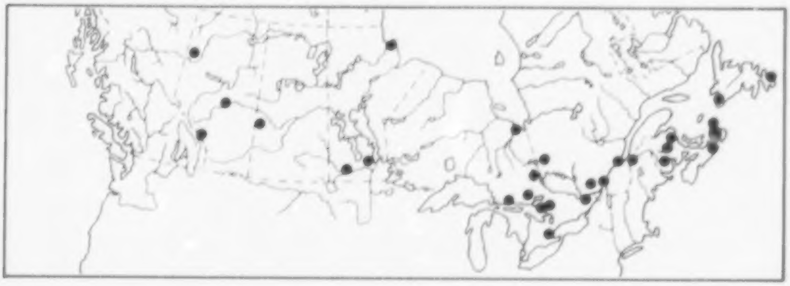
Female. Length 10–12 mm. Eye with narrow transverse reddish brown stripe in dried specimens; postocular fringe of hairs usually predominantly yellow. Frons with blackish median elliptical area bordered by yellowish integument, and entirely covered by brownish pruinosity and short inconspicuous yellow and black hair. Subcallus yellowish, pruinose. Clypeus and gena mostly white pruinose, white-haired; gena with upper part brownish-tinged. Second palpomere pale yellow, predominantly black-haired.

Thorax mainly blackish; notopleural and supra-alar lobes yellow to reddish; scutum and scutellum with recumbent orange to pale yellow hairs and erect black hairs, the latter most conspicuous on notopleural lobes; pleura and coxae whitish pruinose, white-haired. Legs mostly yellowish orange to pale brown. Halter yellow. Wing membrane, including costal cell, clear; calypteral hair tuft usually white; setae on anterior wing veins usually predominantly black, occasionally mostly yellow.

Abdomen dorsally mostly dark brown to black; tergites with sides more or less yellow; tergite 2 with yellowing most extensive, sometimes comprising two-thirds width of segment but reduced on preceding and following tergites; yellow hair exclusively present on lateral and posterior margins, and sometimes nearly evenly mixed with black hairs anteromedially or black hairs dominant anteromedially. Sternites predominantly to completely black in ground color and mainly white-haired; sternites 6 or 7 with sparse black hair.

Male. Differs from the female as follows: Postocular fringe of hairs long, mostly white to yellow, occasionally bronze in color; pale hair on scutum and abdomen usually yellow to off-white but sometimes as white as pleural hair; notopleural lobe sometimes dark; black hair almost absent on scutum and often very sparse on abdomen; anterior wing veins with setae predominantly to completely yellow.

Remarks. This is another species that is variable in integument and hair color. This variation is seen in specimens from the same locality. The most distinctive diagnostic features are the yellowish notopleural lobe and the hyaline costal cell. One feature or both, preferably combined with predominantly pale postocular hairs, some trace of an eye stripe, and the presence of some yellow hairs on all aspects of the abdominal tergites, usually provide a reliable identification.



Map 74. Collection localities of *Atylotus hyalicosta*.

The larva and pupa of this species, described as *Atylotus* sp. A by Teskey (1969), were collected in a willow-sedge marsh, woodland swamps, and a wet beaver meadow.

Distribution. Collections have been made in most Canadian provinces, from northern Alberta to Newfoundland (Map 74), south to Wyoming, Minnesota, and West Virginia. The Canadian specimens were collected from 11 June to 21 August.

Atylotus insuetus (Osten Sacken)

Map 75

Tabanus insuetus Osten Sacken, 1877:219.
Atylotus incisuralis (Macquart); Philip, 1941*b*:105.
Atylotus insuetus: Stone, 1938:20.

Female. Length 10–12 mm, predominantly grayish black. Head gray pruinose, dominantly white-haired, including relatively short postocular fringe; black hair confined to frons and sparsely on clypeus and genae. Frons with basal and median calli subquadrate to oval or round, glossy black, about half the width of frons. Antenna yellow to orange; apical flagellomeres more or less darkened. Clypeus with semicircular glossy areas below each antenna. Eye with short pubescence and narrow transverse dark stripe.

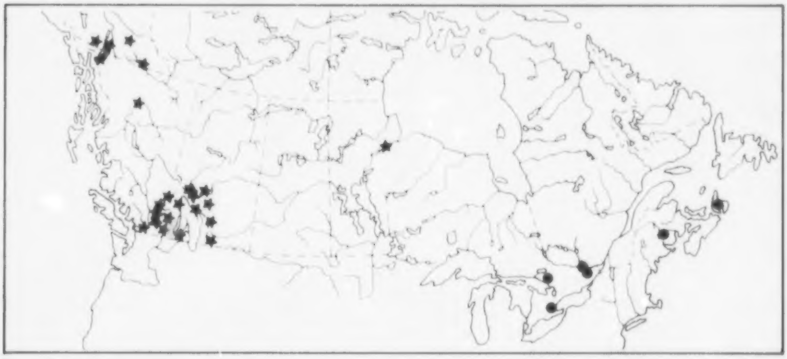
Thorax with scutum subshiny black, sometimes with faintly paler longitudinal stripes, recumbent white hair, and erect black hair. Notopleural lobe usually black. Pleurae and coxae more grayish pruinose, with white hair. Legs mostly yellow; coxae, base of femora, apex of tibia, and tarsi more or less darkened. Wing with costal cell faintly yellow; spur vein rarely present.

Abdomen black; anterior tergites and sternites with sides narrowly yellow; tergites with median and sublateral triangular to oblique pale areas of yellowish white hairs.

Male. Similar to female but with longer body hair. Eye with dorsomedial ommatidia distinctly enlarged and with longer and more dense pubescence. Abdomen narrowly but more distinctly yellow anterolaterally.

Remarks. This species has been known for much of the past 40 years under the name of *A. incisuralis* (Macquart) until Pechuman (1981) discovered the error. It was considered to be the commonest western *Atylotus* until Teskey (1983) recognized that two species were confused and were known under the same name; he called the other *A. calcar*. The two species are readily differentiated by the key. They are also differentiated in their larval and pupal stages, larval habitat type, and associated adult habitat type. Larvae of *A. insuetus* have been found only in hilly to mountainous freshwater wetlands, associated with forest areas. Adults have also been found most frequently in such regions. The larval and adult habitat of *A. calcar* is associated with dry lower elevations, where brackish water habitats prevail (Teskey 1983).

Distribution. This species has been collected in montane areas from southern Yukon to British Columbia and Alberta, with one specimen from Gillam, Man. (Map 75), suggesting that the species may be present throughout the northern forested areas of the Prairie Provinces. The species extends south through the mountains to Arizona. Collection dates in Canada extend from 30 June to 16 August.



Map 75. Collection localities of *Atylotus insuetus* (★) and *A. palus* (●).

Atylotus intermedius (Walker)

Tabanus intermedius Walker, 1848:173.

Tabanus incisuralis of some authors, not Macquart, in reference to eastern North America specimens

Tabanus pemeticus Johnson, 1921:11.

Atylotus intermedius: Teskey, 1983:31.

Female. Length 12–14 mm. Eye orange brown when dried, sparsely short pilose, with transverse narrow reddish stripe. Postocular fringe of short yellow hairs. Frons mostly black, covered by grayish to brown pruinosity and yellow and black hair; basal callus present or lacking, subspherical, denuded, brownish, less than half the width of frons; median callus ragged, linear, black. Subcallus yellowish brown, pruinose. Clypeus and gena mainly black in ground color, covered with white pruinosity, mostly white-haired, genae with upper margin brownish tinged.

Scutum and scutellum mainly black; notopleural lobe and postalar and supra-alar lobes more or less orange, with yellowish recumbent hairs dominant over sparse erect black hairs, except on notopleural lobes. Pleura and coxae black, covered with white pruinosity, completely white-haired; remainder of legs mostly orange. Halter orange. Wing with costal cell yellow; furcation of R_{4+5} with short spur vein; setae on anterior wing veins predominantly black; calypteral hair tuft yellow.

Abdomen dorsally grayish brown pruinose over mostly dark integument; only tergite 1 with posterolateral corner and other tergites with narrow reflexed sides yellow; tergite 1 with predominantly yellow hair concentrated laterally on posterior margins and in median triangle; black hairs dominant elsewhere, but with much intermixing along adjacent segmental margins, making distributional patterns vague. Sternites grayish pruinose, with predominantly yellowish white hairs and sparse black hairs medially.

Male. Similar to female except as follows. Postocular fringe with long yellow and black hair; ocellar tubercle predominantly yellow-haired. Gena completely yellow-haired. Scutum with long, predominantly yellowish hair. Pleura mainly with long white hair; anepisternum and laterotergite with yellowish hair tufts. Legs with bases of femora dark brown to black. Abdominal tergites more broadly yellowish laterally and dominantly yellow-haired laterally and on posterior margins, but with black and white hairs mixed elsewhere.

Remarks. Some females of this species have frontal calli of variable size. Thus, *A. intermedius* and *A. woodi* Pechuman are the only eastern species resembling, in this way, the western *A. insuetus* group of species. However, the females of *A. intermedius* that lack frontal calli may pose difficulties in identification. *Atylotus intermedius* is the largest of the eastern species, with a minimum length of 12 mm. No other eastern species exceeds this size, but some specimens of *A. sphagnicolus* Teskey that do reach 12 mm may be inseparable.

The immature stages of *A. intermedius* are unknown.

Distribution. *Atylotus intermedius* has been rarely collected. Only 10 specimens are known, four from Canada in Ontario (St. Martins Falls, Albany River, Kenora, Lake Abitibi) and the remainder from Michigan and Maine. Collection dates range from 20 July to 20 August.

Atylotus ohioensis (Hine)

Tabanus pruinosus Hine, 1900:248 (preocc. Bigot, 1892).
Tabanus ohioensis Hine, 1901:28 (new name for *pruinosus* Hine).
Atylotus ohioensis: Philip, 1947:288.

Female. Length 8–10 mm. Head with occiput and gena dark grayish. Frons, subcallus, clypeus, and upper portion of gena more or less yellow and covered with whitish pruinosity and white hair, including postocular fringe. Eye usually with partial transverse stripe in dried specimens and with relatively long dense pile.

Thorax dark, covered with whitish pruinosity and predominantly white hairs; notopleura and scutum with a few black hairs. Legs predominantly yellow; coxae and base of femora grayish black. Wing with all membranous areas clear. Halter yellow.

Abdomen blackish, with white hairs on tergites and sternites. Sternites almost exclusively white-haired. Tergites with lateral and caudal margins having white hairs more or less exclusively; tergites with discal areas having dominant black hairs usually intermixed with white hairs.

Male. Differs from female as follows: Eye with dense long white pubescence; postocular fringe of long white hairs. Antenna with scape and pedicel usually completely white-haired or with very sparse black hairs; basal flagellomere more slender, usually with shallow dorsal excision. Thoracic scutal hairs completely white. Abdomen with sides of tergites 1–3 yellow; all tergites predominantly white-haired, including median discal areas.

Remarks. Adults of this species are distinctive because of their smaller size, completely white hairs, including the postocular fringe and the setae on the anterior wing veins of both sexes, and subquadrate basal flagellomere. Specimens of *A. sublunaticornis*

(Zetterstedt) are the only others where the pale hairs are extensively white, but they differ in having the postocular fringe and wing vein setae black and a more slender basal flagellomere. Specimens of *A. thoracicus* (Hine) are actually the most similar, but are readily distinguished by the pale hairs on the scutum and the abdomen showing at least a slight yellowish tinge, which is especially evident in contrast to the white hairs on the thoracic pleuron. In addition, there are fewer black hairs on the abdominal tergites, the notopleural lobe, and the palpus of *A. thoracicus*, especially in females; the integument on the sides of the abdominal tergites is more extensively yellowish.

Teskey (1969) described the larva and pupa, the larvae having been collected mainly in spring-fed seepage beds.

Distribution. *Atylotus ohioensis*, although not yet collected in Canada, is almost certainly present in southern Ontario. It is well established in adjacent areas of New York and Michigan and extends south to a line between Iowa and Pennsylvania, closely bordering the Great Lakes except Lake Superior. The flight period is from mid June to August.

Atylotus palus Teskey

Map 75

Atylotus palus Teskey 1983:28.

Female. Length 9–11 mm. Eye sometimes with partial stripe, sparsely short pilose. Frons predominantly dark, covered with gray and brown pruinosity and with yellow and black hair. Postocular fringe of mixed yellow and black hairs. Subcallus yellow. Clypeus and gena with predominantly dark integument covered by grayish to brown pruinosity and mainly yellow hairs; gena with a few black hairs on the upper part.

Thorax, including coxae, with black integument, overlaid on pleura and coxae with whitish pruinosity and white hairs; scutum with brownish pruinosity and bright yellow recumbent hairs and sparser more erect black hairs. Legs mostly yellow to orange; bases of mid and hind femora, apex of fore tibia, and fore tarsi darkened. Wing membrane mainly clear; costal, humeral, and stem cells yellowish; veins C, Sc, and R_1 with predominantly black setae; costa with anterior margin having yellow setae. Calypteral hair tuft yellow. Halter orange.

Abdominal ground color predominantly brownish black, but first 2 or 3 tergites often with lateral one-quarter to one-third more or less distinctly yellow; all tergites usually with bright yellow and black hair in a fairly consistent pattern; yellow hair generally dominant laterally on posterior margins, and in median posteriorly based triangles nearly or quite crossing tergites; black hair forming submedian anterior inverted triangles bordering median triangles, with some mixing of hair colors sublaterally. Some specimens with tergites almost completely yellow-haired. Sternites almost completely pale yellow-haired; terminal segments with some sparse erect black hair.

Male. Differs from female as follows: Postocular fringe predominantly black or orange-tinted, with yellow hairs largely confined to the central ocellar tubercle area. Eye hairs less dense than in other species and no more than 0.1 mm long. Mesanepisternum and sometimes laterotergite with conspicuous yellow hairs. Abdominal tergites dominantly black-haired anteromedially; narrow lateral and posterior margins exclusively yellow-haired, with mixing of hair color sublaterally; yellow hair on hind margins of anterior 3 or 4 tergites, with median triangular expansion.

Remarks. Adults, especially females, resemble *A. sphagnicolus* Teskey, some so closely that their conspecificity might be possible. However, the consistent difference in the length of the eye hairs and color of the mesanepisternal hairs of males and the great differences in the immature stages should dispel this possibility. In addition, the preferred breeding sites of the two species are quite different: *A. palus* appears to be restricted to neutral or alkaline wetlands, whereas *A. sphagnicolus* appears to be partial to sphagnum bogs.

Most females of *A. palus* can be distinguished by the brighter yellow abdominal hairs and the more distinctive median triangles of yellow hair on the tergites.

Teskey (1983) described larvae and pupae, the larvae having been found in an alkaline or nutrient-rich bog that is more correctly called a fen.

Distribution. Shown on Map 75 with other collections in New York to Pennsylvania and New Jersey. Collections have been made from late June to mid August.

Atylotus sphagnicolus Teskey

Map 76

Atylotus sphagnicolus Teskey, 1983:34.
Atylotus pemeticus of most authors, not Johnson.

Female. Length of body 8–11 mm, brownish black in general appearance. Eyes lacking transverse stripe, sparsely short pilose.

Frons with underlying integument usually black medially, bordered by yellow, and covered with grayish brown pruinosity and yellow and black hairs. Postocular fringe of predominantly black hair. Subcallus yellow.

Thorax with pleura and coxae white pruinose, white-haired; scutum brownish pruinose, with recumbent yellow hair and sparser erect black hair. Leg segments beyond coxae mainly yellow; femora with base usually darkened. Halter yellowish orange. Wing with costal, humeral, and stem cells yellow-tinted, contrasting with clear membrane elsewhere; anterior wing veins with predominantly black setae; calypteral tuft of hairs usually yellow.

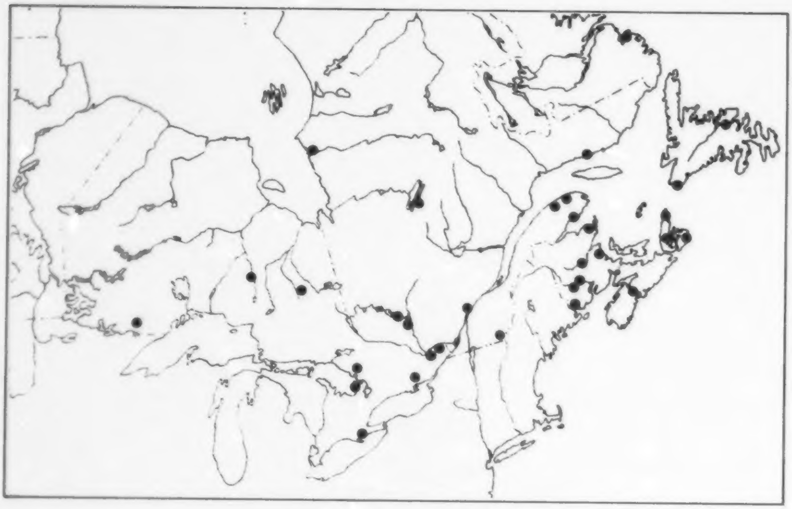
Abdominal integument predominantly brownish black, with sides of first 2 tergites narrowly yellow; all tergites exclusively very pale to bright yellow-haired laterally and on posterior margins, but usually mixed with black hairs elsewhere; in some specimens, black hair forming dominant or exclusive patches anteriorly or sublaterally near anterior margins of first 3 or 4 tergites. Sternum blackish, with pale yellow to white hair; last 3 visible sternites with sparse black hair.

Male. Differs from female as follows: Postocular fringe with long, predominantly black hairs; eye hairs white, very dense, and about 0.15 mm long. Femora usually with basal half (or more) blackened. Abdominal tergites 1 and 2 with yellow and black hairs uniformly mixed; tergites 3–5 with black hair predominant in anterior and sublateral positions.

Remarks. Adults of *Atylotus sphagnicolus* are quite similar to those of *A. palus* Teskey in size; dimensions of frons, palpus, and flagellum; and in the pattern and coloring of hairs on the body. It is frequently difficult to distinguish the females of the two species. The only difference is the brighter yellow hairs and more prominent isolation of groups of black and yellow hairs on the abdominal tergites of *A. palus*. Males may be readily distinguished by the color of hairs on the upper margin of the mesanepisternum (yellow in *A. palus*, white in *A. sphagnicolus*) and the difference in length of the eye hairs. The nature of the collection site, whether a sphagnum bog or a fen, should also contribute to an accurate identification.

Teskey (1983) described the larva and pupa of *A. sphagnicolus*, collected in a sphagnum bog.

Distribution. Collections have been made in scattered localities covering much of eastern Canada (Map 76) and south to the southern border of New York and Connecticut. Collection dates extend from 13 June to the end of July.



Map 76. Collection localities of *Atylotus sphagnicolus*.

Atylotus sublunaticornis (Zetterstedt)

Fig. 60; Map 77

Tabanus sublunaticornis Zetterstedt, 1842:118.
Tabanus plebejus of some authors, not Fallén, 1817.
Baikalia vaillanti Surcouf, 1921:39.
Atylotus sublunaticornis: Chvala, Lyneborg, & Moucha 1972:262.

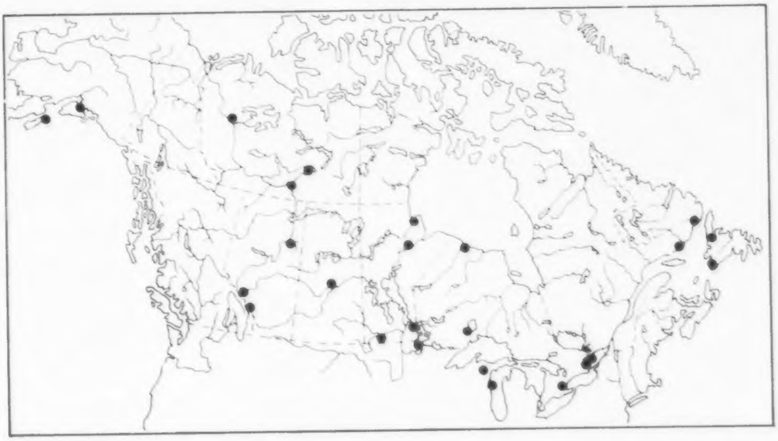
Female: Length 9–12 mm, predominantly black integument, with white and black hairs. Eye short pilose, usually with vestige of single transverse eye stripe in dried specimen. Frons dark, with areas of white pruinosity. Postocular fringe of hairs black. Subcallus with underlying integument more or less yellow. Clypeus and gena whitish pruinose, with white and black hairs, the latter more abundant on genae (Fig. 61).

Thorax and coxae white pruinose over black integument; scutum and scutellum with more or less recumbent white hair and erect black hair. Pleura and coxae with longer erect white hair; remaining leg segments with integument yellow, darkened at apex of fore tibia and tarsus and at base of mid and hind femora, the leg segments with mostly black hair, except yellow hair mixed with black on mid and hind femora. Wing with calypteral hair tuft white; wing membrane clear; anterior vein setae exclusively black. Halter stem yellow, with knob brownish.

Abdomen dark; tergites with sides narrowly yellow, more extensively so on sides of tergites 1 and 2; tergites with black and white hair, the white hair confined to lateral margins; posterior marginal fringes with sublateral patches of white hair intruding from margin into middle of tergites, the white sublateral patches especially evident on tergites 2 and 3. Sternites with mostly white hair and only a few sparse long black hairs medially.

Male. Differs from female as follows: Abdominal tergites usually more broadly yellow laterally, with this color sometimes extending to tergite 4; white hair on tergites often more extensive, covering lateral third of tergites.

Remarks. This is one of the relatively few species of Tabanidae that occur in North America as well as Europe and Asia (Palaearctic region). Immature stages from each continent have been described by Teskey (1969) (as *A. duplex*) and Jezek (1977). The larvae described by Teskey were found in the same nutrient-rich fen as *A. palus*.



Map 77. Collection localities of *Atylotus sublunaticornis*.

Adults of A. *sublunaticornis* and A. *ohioensis* are the only species known to have all the pale hairs solely white. All others have some clearly contrasting yellow and white hairs.

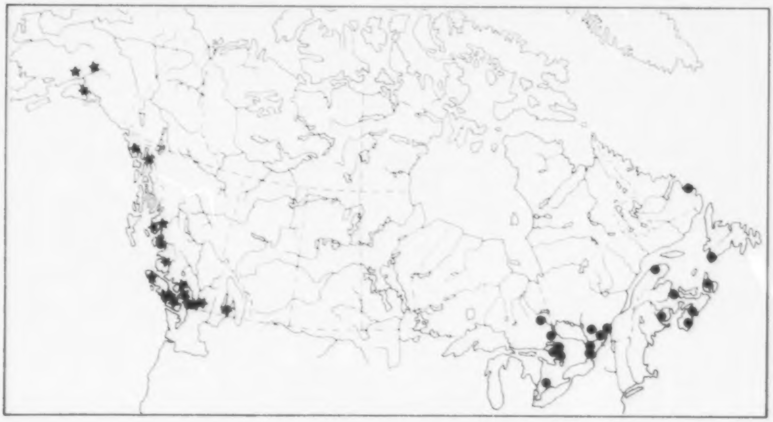
Distribution. *Atylotus sublunaticornis* has been collected in widely scattered localities, from Alaska to Newfoundland (Map 77), with the only extensions into the United States being in Minnesota, Wisconsin, and upper Michigan. Collection dates range from 12 June to 29 July.

Atylotus thoracicus (Hine)

Map 78

Tabanus thoracicus Hine, 1900:248.
Atylotus thoracicus: Philip, 1947:289.

Female. Length 8–11 mm. Head with subcallus and more or less of frons and median occipital sclerite yellow; remainder of head black, covered with mainly white pruinosity and white to faintly yellow hairs, including postocular fringe. Eye rarely with partial transverse dark stripe in dried specimens. Second palpomere sparsely black-haired.



Map 78. Collection localities of *Atylotus thoracicus* (●) and A. *tingaureus* (★).

Thorax and coxae black, covered with whitish pruinosity; pleuron and coxae with white hairs; scutum and scutellum with yellowish hairs; only notopleural lobes usually with sparse black hairs. Legs, except coxae, predominantly yellow; base of mid and hind femora sometimes blackened, predominantly black-haired. Wing with costal cell faintly yellow tinted; setae on anterior veins usually predominantly yellow. Halter yellow. Calypteral tuft of hairs faintly yellow.

Abdomen usually with sides of first 3 or 4 tergites broadly yellow, leaving dark grayish median stripe expanding posteriorly; sternites predominantly yellow; sternite 1 and median triangle on sternite 2 usually dark; entire abdomen mainly with yellow hair; last 2 or 3 tergites and sternites with sparse erect black hairs.

Male. Differs from female as follows: Postocular fringe of hairs long, usually extensively black. Thorax with longer hair; scutum with some black hair among yellow hairs. Basal third or more of femora blackened. Abdomen with rarely more than lateral third of anterior tergites yellow. Sternites usually mostly black; all tergites and sternites usually with black hairs mixed with yellow hairs medially.

Remarks. Adults of this species are readily distinguished by the combination of scutal and abdominal pale hairs yellowish; sparse black hairs on palpus, notopleural lobe, scutum, and abdomen; postocular fringe of hairs white in female and at least partly black in males; and setae on anterior wing veins mostly yellow.

Adults apparently have never been collected outside the confines of acidic sphagnum bogs. Here they seem to be restricted to the open bog moor, away from the lowest of shrub growth. They seem to be rather sedentary, flying only when disturbed and then for only short distances. There are no records of their attempting to take blood. Larvae have been found in compacted sphagnum moss interlaced by grass roots in drier portions of a bog mat, devoid of shrubby growth (Teskey 1969).

Distribution. Restricted to eastern Canada (Map 78) and adjacent northern United States east of upper Michigan and Illinois. Collection dates are confined to July and the first half of August.

Atylotus tingaureus (Philip)

Map 78

Tabanus insuetus var. *tingaureus* Philip, 1936*b*:159.
Atylotus tingaureus: Philip, 1965:331.

Female. Length 11–13 mm, dominantly brownish black. Head grayish pruinose. Frons, clypeus, and gena with yellowish tinge and mixture of yellow and black hairs. Postocular fringe of hairs black, longer than yellow hairs on eyes. Frons with basal and median calli variably shaped, one-third to two-thirds width of frons. Antennae yellow to orange. Clypeus with upper margin below each antenna having hemispherical denuded patches. Second palpomere creamy white, predominantly black-haired.

Thorax black, including notopleural lobe, with dominantly yellow hair and sparse erect black hair. Legs dominantly yellowish orange; coxae black. Wing with costal cell yellowish; base of vein R_4 usually with spur vein.

Abdomen blackish in ground color; tergites 1–3 with sides usually more or less orange; all tergites with rather uniform mixture of yellow and black hair. Sternites mostly with yellow hair and with sparse longer black hair medially.

Male. Similar to female but eyes densely pubescent, with dorsomedial ommatidia enlarged. Postocular fringe of black hair as long as basal flagellomere.

Remarks. This species appears to be restricted to moist montane habitats and appears to be abundant in certain restricted localities. It is readily distinguished from other species having frontal calli by the yellow or golden body hair and the relatively longer black postocular fringe of hair in both sexes.

Distribution: *Atylotus tingaureus* has been collected from Alaska to central California and as far east as western Montana and thus is clearly a Pacific watershed species. It is most abundant in the coastal mountains (Map 78). It has been collected from early July to the first week of September.

Atylotus utahensis (Rowe & Knowlton)

Tabanus utahensis Rowe & Knowlton 1935:242.
Atylotus incisuralis var. *utahensis*: Philip 1965:33.
Atylotus utahensis: Teskey, 1943:699.

Female. Length 9–12 mm. Frons with basal and median subspherical calli no more than half the width of frons. Eye with transverse dark narrow stripe. Body extensively white to pale yellow, pruinose, and with mostly concolorous hairs; sparse black hairs mixed with pale hairs only on basal antennal segments, apical palpomere, notopleural lobe, tibiae, and fore femur. Integument of thorax, beneath pale pruinosity, mostly black; only notopleural and legs yellow; abdomen with integument mostly yellow, only median dorsal stripe black. Costal cell as clear as wing membrane elsewhere.

Male. Not seen.

Remarks. This member of the *A. insuetus* group has been found in dry warm semidesert habitats mainly in the western states of Oregon, Nevada, and Utah (Teskey 1983). However, its presence in one north-central Idaho locality suggests that it might reach the Okanagan Valley of British Columbia.

Atylotus woodi Pechuman

Map 79

Atylotus woodi Pechuman 1981:2.

Female. Length 9–10 mm. Frons grayish yellow pruinose, with yellow and black hair; basal and median calli round, shiny, black, each one-half to one-third width of frons. Eye short pilose, greenish in life, with transverse purplish band, and brownish when dried, with darker band not always evident. Antenna light to dark yellow. Clypeus and gena grayish yellow, dominantly yellow-haired, with glossy black hemispherical patches below each antenna. Palpus yellow, swollen basally, with black and yellow hair.

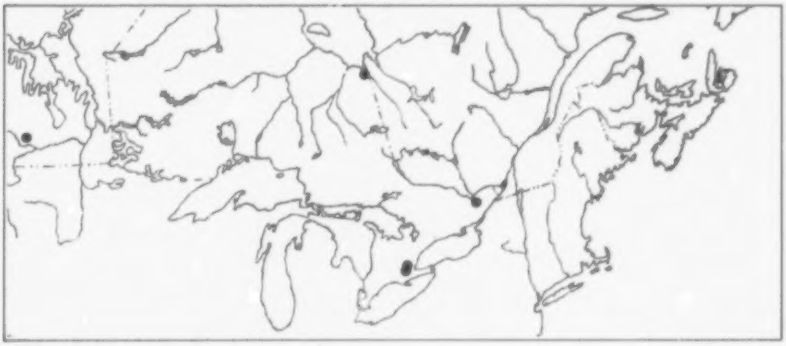
Thorax and coxae mainly black, with gray pruinosity and mainly pale yellow hairs; scutum with some erect black hairs; notopleural lobe yellow. Legs yellow. Wing membrane clear.

Abdomen dorsally with median longitudinal stripe; stripe black, nearly parallel-sided, one-third width of abdomen, with sides orange and hair yellow and black. Sternites orange with yellow hair.

Male. Differs from female as follows: Longer or more erect pale body hairs, especially on eyes; median abdominal dark stripe tapering over first 3 or 4 tergites; sternites 1 and 2 with median black patches.

Remarks. This species could be confused only with *A. intermedius* (Walker) as they are the only eastern species having frontal calli. However, the two are readily differentiated on the basis of size and the shape of the median callus, round in this species and linear in *A. intermedius*.

The immature stages of *A. woodi*, found in a fen near Puslinch, Ont., which produced larvae of several other species of *Atylotus*, were described by Teskey (1969) as sp. C.



Map 79. Collection localities of *Atylotus woodi*.

Distribution. Besides the above locality, the species has been taken in Beverley Swamp, Valens, Ont., in a fen near Richmond, Ont., and in Onah, Man. (Map 79). Single specimens have been recorded from Illinois and Wisconsin. All specimens were collected in August.

Genus *Tabanus* Linnaeus

Length 8–27 mm. Frons broad to very narrow in female, usually widened above, sometimes narrower above, without ocellar tubercle or any evidence of ocelli, although occasionally with denuded, glossy patch at vertex. Basal and median calli often broadly joined to form dorsally tapered, wedge-shaped figure, frequently much narrower than frons. Ocellar tubercle of male completely pruinose and not elevated above plane of eyes. Antenna with enlarged basal flagellomere having more or less prominent dorsal angle; 4, rarely 3, apical flagellomeres nearly subequal in length to basal flagellomere. Eye usually bare, rarely with sparse short hairs; eye blackish blue to purple or brilliantly green in female, if with a pattern this usually comprising 1 or 2, rarely 3, transverse stripes; dorsal 2 of 3 eye stripes sometimes coalescing laterally; male eye often with upper median area of greatly enlarged ommatidia and with sometimes 1 or 2 transverse stripes in ventral area of small ommatidia. Vein Cu lacking dorsal setae. Body color ranging from completely dark brown to black, sometimes with conspicuously paler thorax; most species having median or sublateral paler patches (or both), or abdomen having stripes of various colors and of lesser or greater extent.

Key to species of *Tabanus*

Females

1. Sides of thorax completely black-haired 2

   Sides of thorax conspicuously white-haired 7

2. Thorax, abdomen, and all appendages brown to black, almost completely black-haired 3

   Dorsal surfaces of thorax white pruinose and white-haired, contrasting with dark abdomen and sides of thorax 5

3. Subcallus denuded. Wing entirely, or almost entirely, blackened (eastern) .... ***atratus*** **Fabricius** (p. 303)

   Subcallus not denuded. Wing at least partly clear 4

4. Median callus slender, linear to elliptical, narrowly joined to basal callus (Fig. 69). Bifurcation of R_{4+5} lightly pigmented. Abdominal tergites sometimes with median row of minute white-haired spots (southern British Columbia) .... ***kesseli*** **Philip** (p. 312)

   Median callus broadly joined to basal callus and tapered dorsally (Fig. 61). Bifurcation of R_{4+5} not pigmented. Abdomen completely black (British Columbia) .... ***aegrotus*** **Osten Sacken** (p. 300)

5. Antenna and frontal calli reddish brown to orange (southern Ontario) .... ***stygius*** **Say** (p. 342)

   Antenna and frontal calli black 6

6. Base of fore tibia white. Whole wing infuscated, but more darkly basally and on bifurcation of R_{4+5} (southern British Columbia) .... ***punctifer*** **Osten Sacken** (p. 327)

   Fore tibia uniformly black. Wing with pigmentation restricted to borders of veins, crossveins, and vein junctions (Ontario) .... ***subniger*** **Coquillett** (p. 343)

7. Antennae and second palpomere black with black hairs .... ***sequax*** **Williston** (p. 335)

Antennae or second palpomere at least in part yellow to brown and with pale hairs 8

8. Abdominal tergites unicolorous or with narrow or indistinct paler posterior bands that are not expanded medially into distinct series of shallow median triangles 9

Abdominal tergites with sublateral or median series of paler markings (or both), or stripes 10

9. Wing clear; costal cell dark brown; abdomen usually with narrow gray posterior bands (southern Ontario) . . . . *americanus* **Forster** (p. 302)

Wing uniformly dilutely pigmented; costal cell yellow; abdomen sometimes with traces of small median triangles (southern Ontario) . . . . *calens* **Linnaeus** (in part) (p. 305)

10. Abdominal tergites with median markings sometimes widened at posterior of tergites; markings contiguous and forming a longitudinal median stripe 11

Abdominal tergites with median markings not crossing segments to form an uninterrupted stripe 16

11. Lateral markings on abdominal tergites forming a stripe on each side of median stripe and parallel to it; lateral markings often shorter than median stripe; spots forming median stripe nearly parallel-sided 12

Lateral markings on abdominal tergites broken into separate, often roundish spots and not appearing as a stripe; spots forming median stripe usually widened at posterior margins of abdominal segments and not parallel-sided 15

12. Notopleural lobe concolorous with rest of mesonotum. Frons nearly parallel-sided. Terminal 4 flagellomeres darker and equal to or longer than basal flagellomere. Eye in life with single purple band (Figs. 75, 79) 13

Notopleural lobe reddish orange and contrasting with mesonotum. Frons widened above. Terminal 4 flagellomeres nearly concolorous with and shorter than basal flagellomere. Eye in life with several coalescing purple bands (Figs. 72, 84) 14

13. Costal cell dark yellow. Thorax yellow pruinose. Palpus yellowish. Scape black-haired (Ontario, Quebec) . . . . *quinquevittatus* **Wiedemann** (p. 328)

Costal cell weakly colored. Thorax gray. Palpus whitish. Scape with white hair ventrally (east coast) . . . . *nigrovittatus* **Macquart** (p. 322)

14. Scutellum and thorax concolorous. Frons five to six times as high as basal width (Ontario, Quebec) ..... ***lineola*** **Fabricius** (p. 316)

Scutellum at least faintly reddish on posterior margin. Frons three to four times as high as basal width (widespread) .... ***similis*** **Macquart** (p. 337)

15. Frons five to six times as high as basal width, widened above. Costal cell clear. Palpus white, length more than three times greatest width (southern Ontario) .... ***sackeni*** **Fairchild** (p. 332)

Frons three to four times as high as basal width, nearly parallel-sided. Costal cell darkened. Palpus usually yellow, much swollen at base, length no more than three times greatest width (Ontario) .... ***sagax*** **Osten Sacken** (p. 334)

16. Thorax white. Abdominal tergites dark, with white triangles 17

Thorax neither white nor contrasting strongly with abdomen 18

17. Third, fourth, and fifth abdominal tergites with large white triangles. Fore tibia bicolored (southern Ontario) .... ***trimaculatus*** **Palisot de Beauvois** (p. 347)

Second to sixth abdominal tergites with small white triangles. Fore tibia essentially unicolorous (possibly in eastern Canada) .... ***superjumentarius*** **Whitney** (p. 346)

18. Abdominal tergites with median and sublateral pale spots 19

Abdominal tergites without sublateral spots, although sometimes paler laterally 29

19. Bifurcation of R_{4+5} with dark spot; grayish species (transcontinental) .... ***reinwardtii*** **Wiedemann** (p. 330)

Bifurcation of R_{4+5} without dark spot; color variable (widespread) 20

20. Small species, usually 12 mm or less. Frons widened above. Costal cell clear 21

Larger species, usually 13 mm or more, and differing in at least one other character from the above 24

21. Notopleural lobe black. Antenna usually with only 3 terminal flagellomeres beyond basal one (Fig. 67) (British Columbia, Alberta) .... ***fratellus*** **Williston** (p. 309)

Notopleural lobe orange. Antenna with 4 terminal flagellomeres beyond basal one 22

22. Median callus large. Palpus neither swollen basally nor sharply pointed. Eye in life with 2 purple bands (Fig. 77) (southern Ontario) .... ***pumilus* Macquart** (p. 325)

Median callus slender. Palpus swollen basally but with apex acute. Eye in life unicolorous or with single purple band (Fig. 85) (possibly in Ontario) 23

23. Eye unicolorous .... ***sparus* Whitney** (p. 338)

Eye with single purple band .... ***sparus*** var. ***milleri* Whitney** (p. 340)

24. Antennal scape swollen above (Fig. 66). Sides of subcallus usually with a few hairs laterally (Ontario) .... ***fairchildi* Stone** (p. 308)

Antennal scape not swollen above. Sides of subcallus without hairs 25

25. Eyes sparsely short pilose. Frons 3–3.5 times as high as basal width. Vertex usually partly denuded 26

Eyes bare. Frons usually more than 3.5 times as high as basal width. Vertex evenly pruinose 27

26. Grayish flies with prominent median and sublateral grayish yellow to white patches narrowly crossing abdominal tergites. Sternites gray, with median darker stripe. Fore tibia bicolored. Frontal calli usually brown to black. Subcallus usually completely pruinose (southern British Columbia) .... ***stonei* Philip** (p. 340)

Sides of abdominal tergites or sublateral paler patches distinctly orange. Sternites dominantly yellowish orange, sometimes darkened medially. Fore tibia weakly darkened apically. Frontal calli yellow to brown. Subcallus sparsely pruinose and usually subglossy (coastal British Columbia) .... ***laticeps* Hine** (p. 314)

27. Sublateral white abdominal spots considerably larger than small median triangles and usually reaching anterior border of second and third tergites (Fig. 179) (widespread) .... ***marginalis* Fabricius** (p. 318)

Sublateral spots smaller than relatively larger median triangles and rarely extending to anterior border of tergites 28

28. Last antennal flagellomere yellow. Frons at least four times as high as basal width. Median triangle of third abdominal tergite narrowly reaching anterior margin (Fig. 190). Darker median area on scutum brown (eastern) .... ***fulvicallus* Philip** (p. 311)

Last antennal flagellomere black. Frons usually less than four times as high as basal width. Median triangle of third abdominal tergite not reaching anterior margin. Darker median area on scutum black (eastern) .... ***vivax* Osten Sacken** (p. 348)

29. Bifurcation of R$_{4+5}$ with a dark spot 30

Bifurcation of R$_{4+5}$ without a dark spot; veins possibly with indistinct dusky margins 31

30. Cell R$_5$ closed and usually petiolate at apical margin of wing. Frons 4–4.5 times as high as basal width (Fig. 89) (southern Ontario) .... ***sulcifrons* Macquart** (p. 344)

Cell R$_5$ narrowed to apical margin but rarely closed. Frons 4.5–6.5 times as high as basal width (Fig. 71) (southern Ontario) .... ***limbatinevris* Macquart** (p. 315)

31. Wing usually clear; costal cell sometimes slightly tinted. Smallish species; abdominal tergites with posterior margins narrowly white pruinose and expanding into conspicuous median triangles. Subcallus often partly denuded (Ontario) .... ***nigripes* Wiedemann** (p. 320)

Wing with a smoky tinge; costal cell heavily colored. Large species; median abdominal triangles small or obsolete. Subcallus always pruinose 32

32. Fore tibia bicolored. Paler scutal hairs golden (eastern) .... ***novaescotiae* Macquart** (p. 323)

Fore tibia unicolorous. Paler scutal hairs creamy white 33

33. Basal flagellomere reddish yellow. Median abdominal triangles faint and arising from faint posterior bands, or cell r$_5$ narrowed toward margin (southern Ontario) .... ***calens* Linnaeus** (in part) (p. 305)

Basal flagellomere partly black. Median abdominal triangles small but distinct and not arising from bands; cell r$_5$ not narrowed (eastern) .... ***catenatus* Walker** (p. 306)

Key to species of *Tabanus*

Males

1. Eye hairy, although often very sparsely 2

Eye bare 6

2. Wing with dark spots on crossveins and furcation of veins 3

Wing unspotted 4

3. Antenna and legs black (southern British Columbia) . . . . ***sequax* Williston** (p. 335)

Basal flagellomere and tibiae pale (transcontinental) . . . . ***reinwardtii* Wiedemann** (p. 330)

4. Areas of large and small eye facets markedly differentiated, with distinct line of demarcation (coastal British Columbia) . . . . ***laticeps* Hine** (p. 314)

Areas of large and small facets slightly differentiated, but without distinct line of demarcation 5

5. Eastern North American species (Ontario) . . . . ***fairchildi* Stone** (p. 308)

Western montane species (southern British Columbia) . . . . ***stonei* Philip** (p. 340)

6. Abdomen unicolorous or, if with narrow indistinct paler pruinose bands, specimen more than 20 mm long 7

Abdomen with median or sublateral paler markings or, if markings not distinctly paler than marginal pale bands, specimen not more than 15 mm long 14

7. Palpus orange brown to yellow 8

Palpus dark brown to black 9

8. Wing dilutely pigmented; costal cell darker. Hind tibial fringe black (southern Ontario) . . . . . ***calens* Linnaeus** (in part) (p. 305)

Wing clear; costal cell deep yellow. Hind tibial fringe orange (southern Ontario) . . . . ***americanus* Forster** (p. 302)

9. Wing blackened (eastern) . . . . ***atratus* Fabricius** (p. 303)

Wing dilutely pigmented or clear, often with black spot at bifurcation of R_{4+5} 9

10. Dorsal surface of thorax white or brown pruinose, with concolorous hair; hair contrasting with black integument and hairs of abdomen and sides of thorax 11

Dorsal surface of thorax black or brown with nearly completely black hair; hair concolorous with abdomen and sides of thorax 12

11. Dorsal surface of thorax with brown pruinosity and hair. Basal flagellomere of antenna orange (southern Ontario) . . . . ***stygius* Say** (p. 342)

Dorsal surface of thorax with white pruinosity and hair. Basal flagellomere black (southern British Columbia) . . . . ***punctifer* Osten Sacken** (p. 327)

12. Wing with margins of veins pigmented, especially spots on crossveins and furcation of veins (Ontario) .... ***subniger*** **Coquillett** (p. 343)

Wing clear, except for costal cell 13

13. Eye with dorsomedial ommatidia distinctly larger than bordering ommatidia; smaller lower ommatidia separated by distinct line of demarcation (southern British Columbia) .... ***kesseli*** **Philip** (p. 312)

Eye with dorsomedial upper ommatidia only slightly larger than bordering ommatidia; smaller lower ommatidia not separated by distinct line of demarcation (British Columbia) .... ***aegrotus*** **Osten Sacken** (p. 300)

14. Abdominal tergites with median paler markings sometimes widened at posterior margins, but contiguous and forming a longitudinal median stripe 15

Abdominal tergites with median pale markings not crossing segments to form an uninterrupted stripe 20

15. Spots forming median stripe on abdomen parallel-sided; tergites 1 to 3 or 4 with pale lateral markings contiguous, sometimes forming lateral stripe 16

Median stripe usually wider at posterior margin of each tergite; tergites with pale lateral markings broken into separate often roundish spots 19

16. Notopleural lobe usually concolorous with scutum. Annulate portion of flagellum as long as or longer than basal portion. Costal cell pigmented. Palpus yellow 17

Notopleural lobe usually paler than scutum. Annulate portion of flagellum usually shorter than basal portion. Costal cell clear. Palpus whitish 18

17. Eye with ventral and dorsal margin broadly darkened in dried specimens. Palpus white. Costal cell lightly pigmented (east coast) .... ***nigrovittatus*** **Macquart** (p. 322)

Only ventral margin of eye darkened in dried specimens, with remainder yellowish. Palpus yellow. Costal cell heavily pigmented (Ontario, Quebec) .... ***quinquevittatus*** **Wiedemann** (p. 328)

18. Scutellum and scutum concolorous black. Femora black, contrasting with yellow tibiae (Ontario, Quebec) .... ***lineola*** **Fabricius** (p. 316)

Scutellum at least faintly reddish on posterior margin. Legs entirely yellow (widespread) .... ***similis*** **Macquart** (p. 337)

19. Hairs of scutum gray. Sublateral abdominal spots grayish. Costal cell clear. Palpus white (southern Ontario) . . . . ***sackeni* Fairchild** (p. 332)

At least short hairs of scutum yellow. Sublateral abdominal spots yellow. Costal cell tinted. Palpus yellow (Ontario) . . . . ***sagax* Osten Sacken** (p. 334)

20. Abdomen with median spots or triangles; at least some tergites with sublateral spots 21

Abdomen with median spots or triangles but lacking distinct sublateral spots; some tergites perhaps paler laterally 28

21. Antennal scape swollen above. Basal flagellomere entirely black. Eye sometimes with sparse hairs (Ontario) . . . . ***fairchildi* Stone** (p. 308)

Antennal scape not swollen. Basal flagellomere variable. Eye bare 22

22. Fore tibia entirely black. Sublateral spots very large, often crossing second and third tergites. Basal flagellomere black (widespread) . . . . ***marginalis* Fabricius** (p. 318)

Fore tibia paler at base. Sublateral spots smaller, rarely crossing any tergite. Basal flagellomere not entirely black 23

23. Moderate-sized species, 12–15 mm long. Second palpomere yellow brown, about twice as long as wide. Median abdominal triangles moderately large, sometimes crossing tergite. Sublateral spots reaching posterior margin of at least second tergite. Costal cell lightly pigmented 24

Small species, usually under 11 mm. Second palpomere whitish, less than twice as long as thick. Median abdominal triangles small, never crossing tergite. Sublateral spots small, rarely reaching posterior margins of tergites. Costal cell clear 25

24. Subcallus yellow; size differential between larger dorsomedial ommatidia and smaller ventral lateral and dorsal ommatidia rather abrupt and almost linear (eastern) . . . . ***vivax* Osten Sacken** (p. 348)

Subcallus grayish brown. Size differential between larger dorsomedial ommatidia and smaller ventral lateral and dorsal ommatidia more gradual and not in a very distinct line (eastern) . . . . ***fulvicallus* Philip** (p. 311)

25. Notopleural lobe dark, concolorous with scutum (British Columbia and Alberta . . . . ***fratellus* Williston** (p. 309)

Notopleural lobe distinctly paler than scutum 26

26. Tibiae same color as reddish brown to brown femora or slightly paler basally. Antenna yellowish, often with annulate portion of flagellum somewhat darker. Basal flagellomere 2.5–3 times as long as wide. Ocellar tubercle prominent and often projecting above level of eyes (southern Ontario) . . . . ***pumilus* Macquart** (p. 325)

Tibiae distinctly paler than dark femora; fore tibia with dark apex. Antenna uniformly dull brownish. Basal flagellomere about twice as long as wide. Ocellar tubercle inconspicuous and compressed, usually not reaching level of eyes (possibly present in southern Ontario) 27

27. Eye in life without stripes . . . . ***sparus* Whitney** (p. 338)

Eye in life with single purple stripe . . . . ***sparus* var. *milleri* Whitney** (p. 340)

28. Pale thorax sharply contrasting with dark abdomen; abdomen with distinct white median triangles on third to fifth tergites. Fore tibia bicolored (southern Ontario) . . . . ***trimaculatus* Palisot de Beauvois** (p. 347)

Not with above combination of characters 29

29. Wing membrane pigmented, bordering some crossveins and bifurcations of veins 30

Wing membrane clear, bordering crossveins and bifurcations of veins 31

30. Lower margin of area of enlarged eye facets straight or curved upward. Scape yellow to light brown. Inner surface of hind tibia with many yellow hairs. Cell r_5 strongly narrowed at wing margin (southern Ontario) . . . . ***limbatinevris* Macquart** (p. 315)

Lower margin of area of enlarged facets curved downward, giving sinuate appearance. Scape usually dark. Inner surface of hind tibia mostly black-haired. Cell r_5 rarely much narrowed at wing margin (southern Ontario) . . . . ***sulcifrons* Macquart** (p. 344)

31. Subcallus partly denuded and subshiny. Smaller species usually under 14 mm (Ontario) . . . . ***nigripes* Wiedemann** (p. 320)

Subcallus pruinose and dull. Larger species 15–25 mm long 32

32. Eyes with ommatidia all about same size (southern Ontario) . . . . ***calens* Linnaeus** (in part) (p. 305)

Eyes with upper ommatidia larger than lower ommatidia, with line of demarcation distinct 33

33. Median triangle usually absent from tergite 2 or very small if present. Large ommatidia occupying about half total eye area. Femora dark brown or black (possibly in eastern Canada) .... ***superjumentarius*** **Whitney** (p. 346)

Median triangle present on tergite 2 and about same size as those on tergites 3 and 4. Large ommatidia occupying about two-thirds of total eye area. Femora orange brown to chestnut brown 34

34. Legs almost uniformly brown; tarsi somewhat darker. Gena brown. Second palpomere brown. Abdomen uniformly dark brown, with small median triangles (eastern) .... ***catenatus*** **Walker** (p. 306)

Mid and hind tibiae and base of fore tibia paler than femora. Gena grayish. Second palpomere yellow brown. Abdomen reddish brown laterally, with median triangles on a narrow black stripe (eastern) .... ***novaescotiae*** **Macquart** (p. 323)

Tableau d'identification des espèces du genre *Tabanus*

Femelles

1. Pilosité des côtés du thorax toute noire 2

Pilosité des côtés du thorax manifestement blanche 7

2. Thorax, abdomen et tous les appendices bruns à noirs, à pilosité presque toute noire 3

Pruinosité et pilosité de la face dorsale du thorax blanches, la faisant contraster avec l'abdomen et les côtés du thorax foncés 5

3. Sous-calus glabre. Aile entièrement foncée ou presque (Est) .... ***atratus*** **Fabricius** (p. 303)

Sous-calus non glabre. Aile au moins en partie transparente ... 4

4. Calus médian mince, de forme linéaire à elliptique, uni par un isthme étroit au calus inférieur (fig. 69). Bifurcation de R_{4+5} légèrement pigmentée. Tergites parfois barrés, en position médiane, d'une rangée de minuscules taches à poils blancs (sud de la Colombie-Britannique) .... ***kesseli*** **Philip** (p. 312)

Calus médian uni par une large soudure au calus inférieur et effilé dans la direction dorsale (fig. 61). Bifurcation de R_{4+5} non pigmentée. Abdomen tout noir (Colombie-Britannique) .... ***aegrotus*** **Osten Sacken** (p. 300)

5. Antenne et calus frontaux brun rougeâtre à orange (sud de l'Ontario) . . . . ***stygius*** **Say** (p. 342)

Antenne et calus frontaux noirs 6

6. Partie basale du tibia antérieur blanche. Aile toute brunâtre, mais plus foncée dans sa partie basale et à la bifurcation de R_{4+5} (sud de la Colombie-Britannique) . . . . ***punctifer*** **Osten Sacken** (p. 327)

Tibia antérieur tout noir. Pigmentation alaire confinée à la bordure des nervures longitudinales et transversales ainsi qu'à leur croisement (Ontario) . . . . ***subniger*** **Coquillett** (p. 343)

7. Antennes et deuxième article du palpe noirs ainsi que leurs poils . . . . ***sequax*** **Williston** (p. 335)

Antennes et deuxième article du palpe au moins en partie jaunes à bruns; leurs poils pâles 8

8. Tergites unicolores ou ornés d'un liséré postérieur étroit ou flou, qui ne se prolonge pas, dans le sens médian en séries distinctes de triangles de faible amplitude 9

Tergites ornés de séries de marques sublatérales ou médianes (ou des deux) plus pâles ou, encore, de rayures 10

9. Aile de teinte claire; cellule costale brun foncé; abdomen habituellement orné de bandes grises et étroites en position postérieure (sud de l'Ontario) . . . . . . ***americanus*** **Forster** (p. 302)

Aile d'une pigmentation uniformément diluée; cellule costale jaune; abdomen parfois orné de traces de petits triangles médians (sud de l'Ontario) . . . . ***calens*** **Linné** (*partim*) (p. 305)

10. Tergites aux marques médianes parfois élargies vers leur partie postérieure; marques contiguës et formant une rayure médiane longitudinale 11

Tergites aux marques médianes ne franchissant pas la limite des segments pour former une rayure ininterrompue 16

11. Marques latérales des tergites formant une rayure de chaque côté de la rayure médiane et parallèlement à celle-ci; marques latérales souvent plus courtes que la rayure médiane; taches formant la rayure médiane presque à côtés parallèles 12

Marques latérales des tergites morcelées en taches distinctes, souvent à peu près rondes et ne présentant pas l'aspect d'une rayure; taches formant la rayure médiane habituellement élargies vers le bord postérieur des segments abdominaux et ne présentant pas de côtés parallèles 15

12. Lobe du notopleurite de même couleur que le reste du mésonotum. Front aux côtés presque parallèles. Les 4 articles terminaux du flagelle plus foncés et de longueur au moins égale à celle de l'article basal. Oeil, chez le sujet vivant, barré d'une seule bande pourpre (fig. 75 et 79) 13

Lobe du notopleurite orange rougeâtre, contrastant avec le mésonotum. Front élargi sur le dessus. Les 4 articles terminaux du flagelle presque de la même couleur, mais plus courts que l'article basal. Oeil, chez le sujet vivant, barré de plusieurs bandes pourpres coalescentes (fig. 72 et 84) 14

13. Cellule costale jaune foncé. Pruinosité du thorax jaune. Palpe jaunâtre. Poils du scape noirs (Ontario et Québec) .... *quinquevittatus* **Wiedemann** (p. 328)

Cellule costale faiblement colorée. Thorax gris. Palpe blanchâtre. Poils de la face ventrale du scape blancs (côte est) .... *nigrovittatus* **Macquart** (p. 322)

14. Scutellum et thorax de la même couleur. Front de 5 à 6 fois plus haut qu'il n'est large à sa base (Ontario, Québec) .... *lineola* **Fabricius** (p. 316)

Scutellum au moins faiblement rougeâtre sur son bord postérieur. Front 3 à 4 fois plus haut qu'il n'est large à sa base (espèce répandue) .... *similis* **Macquart** (p. 337)

15. Front de 5 à 6 fois plus haut qu'il n'est large à sa base, élargi sur le dessus. Cellule costale de teinte claire. Palpe blanc, plus de 3 fois plus long que sa largeur maximale (sud de l'Ontario) .... *sackeni* **Fairchild** (p. 332)

Front de 3 à 4 fois plus haut qu'il n'est large à sa base, aux côtés presque parallèles. Cellule costale foncée. Palpe habituellement jaune, considérablement renflé à sa base, pas plus de 3 fois plus long que sa largeur maximale (Ontario) .... *sagax* **Osten Sacken** (p. 334)

16. Thorax blanc. Tergites foncés, ornés de triangles blancs 17

Thorax ni blanc ni contrastant fortement avec l'abdomen 18

17. Tergites 3, 4 et 5 ornés de gros triangles blancs. Tibia antérieur bicolore (sud de l'Ontario) .... *trimaculatus* **Palisot de Beauvois** (p. 347)

Tergites 2 à 6 ornés de petits triangles blancs. Tibia antérieur essentiellement unicolore (peut-être dans l'est du Canada) .... *superjumentarius* **Whitney** (p. 346)

18. Tergites ponctués de taches médianes et sublatérales pâles ... 19

Tergites sans tache sublatérale bien que parfois plus pâles sur les côtés 29

19. Bifurcation de R_{4+5} marquée d'une tache foncée; espèce à la livrée grisâtre (d'un bout à l'autre du continent) .... ***reinwardtii* Wiedemann** (p. 330)

Bifurcation de R_{4+5} sans tache foncée; couleur de la livrée variable (espèces répandues) 20

20. Espèces de petite taille, habituellement de 12 mm au plus. Front élargi sur le dessus. Cellule costale de teinte claire 21

Espèces de grande taille, habituellement de 13 mm et plus, et différant des espèces précitées par au moins un autre caractère 24

21. Lobe du notopleurite noir. Antenne habituellement pourvue de 3 articles terminaux outre l'article basal du flagelle (fig. 67) (Colombie-Britannique et Alberta) .... ***fratellus* Williston** (p. 309)

Lobe du notopleurite orange. Antenne dotée de 4 articles terminaux outre l'article basal du flagelle 22

22. Calus médian gros. Palpe ni enflé à la base ni acéré. Oeil, chez le spécimen vivant, doté de 2 bandes pourpres (fig. 77) (sud de l'Ontario) .... ***pumilus* Macquart** (p. 325)

Calus médian petit. Palpe enflé à sa base, mais à l'apex aigu. Oeil, chez le spécimen vivant, unicolore ou barré d'une seule bande pourpre (fig. 85) (peut-être en Ontario) 23

23. Oeil unicolore .... ***sparus* Whitney** (p. 338)

Oeil barré d'une seule bande pourpre .... ***sparus* var. *milleri* Whitney**(p. 340)

24. Scape enflé sur le dessus (fig. 66). Côtés du sous-calus habituellement parsemés de quelques poils disposés latéralement (Ontario) .... ***fairchildi* Stone** (p. 308)

Scape non enflé sur le dessus. Côtés du sous-calus glabres 25

25. Pilosité de l'oeil courte et clairsemée. Front de 3 à 3,5 fois plus haut que large à sa base. Vertex en général partiellement glabre 26

Oeil glabre. Front habituellement plus de 3,5 fois plus haut que large à sa base. Vertex de pruinosité égale 27

26. Mouches à la livrée grisâtre, ornée de plages visibles jaune grisâtre à blanches en position médiane et sublatérale traversant les tergites en un front étroit. Sternites gris, soulignés d'une rayure médiane plus foncée. Tibia antérieur bicolore. Calus frontaux habituellement bruns à noirs. Sous-calus habituellement tout pruineux (sud de la Colombie-Britannique) .... ***stonei* Philip** (p. 340)

Côtés des tergites ou des plages sublatérales plus pâles nettement orange. Sternites surtout orange jaunâtre, parfois foncés en position médiane. Tibia antérieur faiblement foncé dans le sens apical. Calus frontaux jaunes à bruns. Sous-calus à pruinosité clairsemée et habituellement presque lustrée (région côtière de la Colombie-Britannique) .... ***laticeps*** **Hine** (p. 314)

27. Taches abdominales blanches en position sublatérale considérablement plus grosses que les petits triangles médians et atteignant habituellement le bord antérieur des tergites 2 et 3 (fig. 179) (espèce répandue) ...... ***marginalis*** **Fabricius** (p. 318)

Taches sublatérales plus petites que les triangles médians relativement gros et atteignant rarement le bord antérieur des tergites 28

28. Dernier article du flagelle jaune. Front au moins 4 fois plus haut que large à sa base. Triangle médian du tergite 3 atteignant le bord antérieur par la pointe (fig. 190). Zone médiane foncée du scutum brune (Est) .... ***fulvicallus*** **Philip** (p. 311)

Dernier article du flagelle de l'antenne noir. Front habituellement moins de 4 fois plus haut que large à sa base. Triangle médian du tergite 3 n'atteignant pas le bord antérieur. Zone médiane foncée du scutum noire (Est) .... ***vivax*** **Osten Sacken** (p. 348)

29. Bifurcation de R_{4+5} marquée d'une tache foncée 30

Bifurcation de R_{4+5} sans tache foncée; nervures pouvant comporter une vague bordure fauve 31

30. Cellule R_5 fermée et habituellement pétiolée sur le bord apical de l'aile. Front de 4 à 4,5 fois plus haut que large à sa base (fig. 89) (sud de l'Ontario) .... ***sulcifrons*** **Macquart** (p. 344)

Cellule R_5 s'étrécissant vers le bord apical, mais rarement fermée. Front de 4,5 à 6,5 fois plus haut que large à sa base (fig. 71) (sud de l'Ontario) ..... ***limbatinevris*** **Macquart** (p. 315)

31. Aile habituellement de teinte claire; cellule costale parfois légèrement teintée. Espèce quelque peu de petite taille; bord postérieur des tergites liséré d'une pruinosité blanche et s'élargissant en triangles médians visibles. Sous-calus souvent partiellement dénudé (Ontario) ... ***nigripes*** **Wiedemann** (p. 320)

Aile à l'aspect fumé; cellule costale fortement colorée. Espèces de grande taille; triangles abdominaux médians petits ou atrophiés. Sous-calus toujours pruineux 32

32. Tibia antérieur bicolore. Poils plus pâles du scutum dorés (Est) .... ***novaescotiae*** **Macquart** (p. 323)

Tibia antérieur d'une seule couleur. Poils pâles du scutum blanc crème 33

33. Article basal du flagelle jaune rougeâtre. Triangles abdominaux médians à peine perceptibles et issus de bandes postérieures également à peine perceptibles ou cellule r_5 étrécie vers le bord (sud de l'Ontario) . . . . *calens* **Linné** (partim) (p. 305)

Article basal du flagelle partiellement noir. Triangles abdominaux médians petits, mais nets et non issus de bandes; cellule r_5 non étrécie (Est) . . . . *catenatus* **Walker** (p. 306)

Tableau d'identification des espèces du genre *Tabanus*

Mâles

1. Oeil pileux, bien que souvent de façon très clairsemée 2

Oeil glabre 6

2. Aile ponctuée de taches foncées sur les nervures transversales et aux bifurcations des nervures 3

Aile sans tache 4

3. Antenne et pattes noires (sud de la Colombie-Britannique) . . . . *sequax* **Williston** (p. 335)

Article basal du flagelle et tibias pâles (d'un bout à l'autre du continent) . . . . *reinwardtii* **Wiedemann** (p. 330)

4. Zones à grandes et à petites facettes de l'oeil nettement différenciées par une ligne nette de démarcation (région côtière de la Colombie-Britannique) . . . . *laticeps* **Hine** (p. 314)

Zones à grandes et à petites facettes légèrement différenciées, mais sans ligne nette de démarcation 5

5. Espèce de l'est de l'Amérique du Nord (Ontario) . . . . *fairchildi* **Stone** (p. 308)

Espèce montagnarde de l'Ouest (sud de la Colombie-Britannique) . . . . *stonei* **Philip** (p. 340)

6. Abdomen unicolore ou, s'il est barré de bandes pruineuses plus pâles, floues et étroites, spécimen de plus de 20 mm de long 7

Abdomen orné de marques plus pâles médianes ou sublatérales ou, si les marques ne sont pas nettement plus pâles que les bandes pâles marginales, spécimen ne mesurant pas plus de 15 mm de long 14

7. Palpe brun orange à jaune 8

Palpe brun foncé à noir 9

8. Aile à pigmentation diluée; cellule costale foncée. Frange du tibia postérieur noire (sud de l'Ontario) .... ***calens*** **Linné** (*partim*) (p. 305)

Aile de teinte claire; cellule costale jaune sombre. Frange du tibia postérieur orange (sud de l'Ontario) .... ***americanus*** **Forster** (p. 302)

9. Aile noircie (Est) .... ***atratus*** **Fabricius** (p. 303)

Aile à pigmentation diluée ou de teinte claire, souvent ponctuée d'une tache noire à la bifurcation de R_{4+5} 9

10. Face dorsale du thorax, pruinosité blanche ou brune, la pilosité étant de la même couleur; poils contrastant avec le tégument noir ainsi qu'avec les poils de l'abdomen et des côtés du thorax 11

Face dorsale du thorax noire ou brune, les poils étant presque tous noirs; poils de même couleur que l'abdomen et les côtés du thorax 12

11. Face dorsale du thorax à pruinosité et à pilosité brunes. Article basal du flagelle de l'antenne orange (sud de l'Ontario) .... ***stygius*** **Say** (p. 342)

Face dorsale du thorax à pruinosité et à pilosité blanches. Article basal du flagelle noir (sud de la Colombie-Britannique) .... ***punctifer*** **Osten Sacken** (p. 327)

12. Bordure des nervures alaires pigmentée, notamment taches sur les nervures transversales et la bifurcation des nervures longitudinales (Ontario) .... ***subniger*** **Coquillett** (p. 343)

Aile transparente, sauf la cellule costale 13

13. Ommatidies dorsomédianes de l'oeil nettement plus grosses que les périphériques; ommatidies inférieures, petites, séparées par une ligne nette de démarcation (sud de la Colombie-Britannique) .... ***kesseli*** **Philip** (p. 312)

Ommatidies dorsomédianes supérieures de l'oeil à peine plus grosses que les périphériques; ommatidies inférieures, plus petites, non séparées par une ligne nette de démarcation (Colombie-Britannique) ...... ***aegrotus*** **Osten Sacken** (p. 300)

14. Tergites ornés de marques médianes pâles, parfois élargies sur le bord postérieur, mais continues et formant une raie médiane longitudinale 15

Tergites ornés de marques médianes pâles ne traversant pas les segments pour former une raie ininterrompue 20

15. Taches formant une raie médio-abdominale aux côtés parallèles; tergites 1 à 3 ou 4 ornés de marques latérales pâles formant parfois une raie latérale 16

Bande médiane habituellement plus large sur le bord postérieur de chaque tergite; marques latérales pâles des tergites morcelées en taches distinctes, souvent à peu près rondes 19

16. Lobe du notopleurite habituellement de la même couleur que le scutum. Partie annelée du flagelle au moins aussi longue que la partie basale. Cellule costale pigmentée. Palpe jaune 17

Lobe du notopleurite habituellement plus pâle que le scutum. Partie annelée du flagelle habituellement plus courte que la partie basale. Cellule costale transparente. Palpe blanchâtre 18

17. Oeil des spécimens desséchés à la marge ventrale et dorsale largement obscurcie. Palpe blanc. Cellule costale légèrement pigmentée (côte est) .... ***nigrovittatus*** **Macquart** (p. 322)

Seule la marge ventrale de l'oeil obscurcie chez les spécimens desséchés, le reste étant jaunâtre. Palpe jaune. Cellule costale fortement pigmentée (Ontario, Québec) .... ***quinquevittatus*** **Wiedemann** (p. 328)

18. Scutellum et scutum du même noir. Fémurs noirs, contrastant avec les tibias jaunes (Ontario, Québec) .... ***lineola*** **Fabricius** (p. 316)

Scutellum au moins faiblement rougeâtre sur son bord postérieur. Pattes toutes jaunes (espèce répandue) .... ***similis*** **Macquart** (p. 337)

19. Pilosité du scutum grise. Taches sublatérales de l'abdomen grisâtres. Cellule costale transparente. Palpe blanc (sud de l'Ontario) .... ***sackeni*** **Fairchild** (p. 332)

Au moins, les poils courts du scutum jaunes. Taches sublatérales de l'abdomen jaunes. Cellule costale pigmentée. Palpe jaune (Ontario) .... ***sagax*** **Osten Sacken** (p. 334)

20. Abdomen orné de taches ou de triangles médians; taches sublatérales sur au moins quelques tergites 21

Abdomen orné de taches ou de triangles médians, mais dépourvu de taches sublatérales nettes; certains tergites peut-être plus pâles vers les côtés 28

21. Scape enflé sur le dessus. Article basal du flagelle tout noir. Oeil portant parfois une pilosité clairsemée (Ontario) .... ***fairchildi*** **Stone** (p. 308)

Scape non enflé. Article basal du flagelle de couleur variable. Oeil glabre 22

22. Tibia antérieur tout noir. Taches sublatérales très grosses, traversant souvent les tergites 2 et 3. Article basal du flagelle noir (espèce épandue) .... *marginalis* **Fabricius** (p. 318)

Partie basale du tibia antérieur pâle. Taches sublatérales petites, traversant rarement le tergite. Article basal du flagelle pas entièrement noir 23

23. Espèces de taille moyenne, de 12 à 15 mm de longueur. Deuxième article du palpe brun jaune, environ deux fois plus long que large. Triangles médians sur l'abdomen modérément étendus, traversant parfois le tergite. Taches sublatérales atteignant le bord postérieur du tergite 2 au moins. Cellule costale légèrement pigmentée 24

Espèces de petite taille, habituellement de moins de 11 mm de longueur. Deuxième article du palpe blanchâtre, moins de deux fois plus long que large. Triangles médians de l'abdomen petits, ne traversant jamais le tergite. Taches sublatérales petites, atteignant rarement le bord postérieur des tergites. Cellule costale transparente 25

24. Sous-calus jaune; le changement entre les grandes facettes oculaires médiodorsales et les petites facettes dorsales ventro-latérales rapide, presque soudain (Est) .... *vivax* **Osten Sacken** (p. 348)

Sous-calus brun grisâtre. Entre la dimension des facettes oculaires médiodorsales, grandes, et celle des facettes dorsales ainsi que ventro-latérales, petites, écart graduel, ne suivant pas une ligne très nette (Est) .... *fulvicallus* **Philip** (p. 311)

25. Lobe du notopleurite foncé, de même couleur que le scutum (Colombie-Britannique et Alberta) .... *fratellus* **Williston** (p. 309)

Lobe du notopleurite nettement plus pâle que le scutum 26

26. Tibias de même couleur que les fémurs brun rougeâtre à bruns ou légèrement plus pâles en position basale. Antenne jaunâtre, la partie annelée du flagelle étant quelque peu plus foncée. Article basal du flagelle de 2,5 à 3 fois plus long que large. Tubercule des ocelles proéminent et se projetant souvent au-dessus du niveau des yeux (sud de l'Ontario) .... *pumilus* **Macquart** (p. 325)

Tibias nettement plus pâles que les fémurs foncés; partie apicale du tibia antérieur foncée. Antenne uniformément brunâtre terne. Article basal du flagelle environ deux fois plus long que large. Tubercule des ocelles peu visible et comprimé, n'atteignant habituellement pas le niveau des yeux (espèces probablement présente dans le sud de l'Ontario) 27

27. Pas de raie oculaire chez les sujets vivants . . . . ***sparus*** **Whitney** (p. 338)

Raie oculaire pourpre chez les sujets vivants . . . . ***sparus*** **var.** ***milleri*** **Whitney** (p. 340)

28. Thorax de couleur pâle, contrastant fortement avec l'abdomen foncé; ce dernier orné de triangles médians blancs, nets, sur les tergites 3 à 5. Tibia antérieur bicolore (sud de l'Ontario) . . . . ***trimaculatus*** **Palisot de Beauvois** (p. 347)

Dépourvu de la combinaison précitée de caractéristiques 29

29. Membrane alaire pigmentée, le long de certaines nervures transversales et autour de certaines bifurcations de nervures 30

Membrane alaire transparente, le long des nervures transversales et autour des bifurcations de nervures 31

30. Bordure inférieure de la région oculaire constituée de grandes facettes rectilignes ou concaves. Scape jaune à brun pâle. Face interne du tibia postérieur portant de nombreux poils jaunes. Cellule r_5 fortement étrécie sur le bord alaire (sud de l'Ontario) . . . . ***limbatinevris*** **Macquart** (p. 315)

Bordure inférieure de la région oculaire constituée de grandes facettes convexe, d'où son aspect sinueux. Scape habituellement foncé. Pilosité de la face interne du tibia postérieur surtout noire. Cellule r_5 rarement très étrécie sur le bord alaire (sud de l'Ontario) . . . . ***sulcifrons*** **Macquart** (p. 344)

31. Sous-calus nu et assez brillant. Espèce de petite taille, habituellement de moins de 14 mm de longueur (Ontario) . . . . ***nigripes*** **Wiedemann** (p. 320)

Sous-calus pruineux et terne. Espèces de grande taille, 15 à 25 mm de longueur 32

32. Ommatidies oculaires toutes à peu près de la même grandeur (sud de l'Ontario) . . . . ***calens*** **Linné** (*partim*) (p. 305)

Ommatidies oculaires supérieures plus grandes que les inférieures; ligne nette de démarcation 33

33. Tergite 2 habituellement sans triangle médian; sinon, ce dernier très petit. Moitié de la superficie totale de l'oeil occupée par de grandes ommatidies. Fémur brun foncé ou noir (espèce peut-être présente dans l'est du Canada) . . . . ***superjumentarius*** **Whitney** (p. 346)

Triangle médian sur le tergite 2 et à peu près des mêmes dimensions que les triangles des tergites 3 et 4. Les deux tiers de la superficie totale de l'oeil occupés par les grandes ommatidies. Fémur brun orange à marron 34

34. Pattes presque uniformément brunes; tarses quelque peu plus foncés. Joue brune. Deuxième article du palpe brun. Abdomen uniformément brun foncé, orné de petits triangles médians (Est) . . . . ***catenatus*** **Walker** (p. 306)

Tibias de la deuxième et troisième paires de pattes et partie basale du tibia de la paire antérieure plus pâles que les fémurs. Joue grisâtre. Deuxième article du palpe brun jaune. Abdomen brun rougeâtre sur les côtés, orné de triangles médians sur une raie noire étroite (Est) . . . . ***noveascotiae*** **Macquart** (p. 323)

Tabanus aegrotus Osten Sacken

Fig. 61; Map 80

Tabanus aegrotus Osten Sacken, 1877:219.

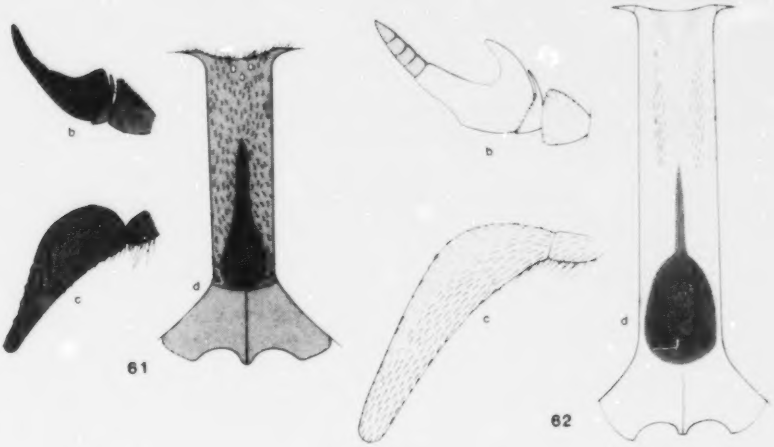
Female. Length 18–23 mm. Eye lacking color pattern. Frons brownish pruinose, four to five times as high as basal width, nearly parallel-sided; basal and median callus broadly joined, forming subglossy dark brown to black lanceolate figure. Subcallus brown pruinose, with patch of hairs laterally. Antenna with basal flagellomere nearly as broad as long, with strong dorsal angle and shallow dorsal excavation. Second palpomere three to four times as long as greatest width, with short recumbent black hair (Fig. 61).

Thorax, legs, and abdomen uniformly dark brown to black, with black hair. Wing with costal cell pigmented.

Male. Identical in coloring to female. Ommatidia of uniform size. Antenna with basal flagellomere more slender than in female. Second palpomere subovoid, nearly twice as long as wide.

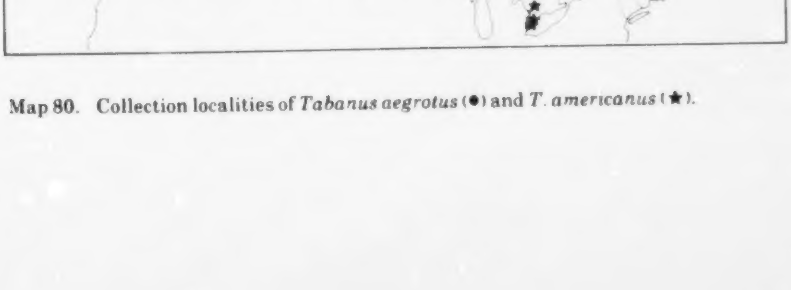
Remarks. The only other totally black-bodied and black-haired horse fly in Canada is *T. kesseli* Philip, which is closely related to *T. aegrotus*, sharing a common range, and the eastern *T. atratus* Fabricius. The latter is quite distinctive because of dark wing pigmentation, but *T. kesseli* and *T. aegrotus* are similar, differing only in a few minor features. However, these features, as given in the key, provide ready separation.

Lane (1975) described the immature stages, found in saturated gravel and sand bordering permanent and temporary creeks.



Figs. 61, 62. Head features of *Tabanus aegrotus* (61) and *T. americanus* (62).

Distribution. The species has been collected only west of the continental divide, from the southern half of British Columbia (Map 80) to southern California. Collection dates in British Columbia extend from late June to mid September.



Map 80. Collection localities of *Tabanus aegrotus* (●) and *T. americanus* (★).

Tabanus americanus Forster

Fig. 62; Map 80

Tabanus americanus Forster, 1771:100.
Tabanus plumbeus Drury, 1773:2.
Tabanus ruficornis Fabricius, 1775:789.
Tabanus limbatus Palisot de Beauvois, 1806:54.

Female. Length 22–27 mm. Eye uniformly brilliant green in life. Frons four to five times as high as basal width, slightly narrowed above, yellowish gray pruinose, with black and yellowish hair; broad basal callus joined to slender median callus and forming a reddish, glossy, lanceolate shape; vertex with triangular subglossy brown area. Subcallus yellow pruinose. Clypeus and gena yellow to orange pruinose, with concolorous hair. Antenna predominantly orange; apical flagellomeres sometimes darkened; basal flagellomere with strong dorsal anteriorly projecting finger-like appendage. Second palpomere orange, with reddish and black hairs, 4–4.5 times as long as greatest width (Fig. 62).

Thorax with notopleural lobe, pleura, and legs reddish and paler than scutum; thorax predominantly white-haired; disc of scutum and scutellum with short black hair. Legs beyond coxae with golden hair. Wing base with dense tufts of white hair above and below, particularly evident on postalar callus; wing mainly hyaline; costal cell darkly pigmented.

Abdominal sternites and usually tergites with posterior margins narrowly white pruinose and white-haired, the tergal bands narrower and sometimes obsolete; elsewhere tergites black-haired. Sternites with black hair confined to central semicircular areas nearly the width of each segment and with sides broadly white-haired.

Male. Very similar to female except as follows: Eye with dorsomedial ommatidia distinctly larger than ventral and lateral ommatidia. Abdomen with caudal margins of tergites more faintly whitish pruinose and lacking white hair; white hair restricted to posterolateral margins of sternites 2–4.

Remarks. This species is among the largest in North America. It is also distinctive because of its reddish legs and head appendages and its white thorax, pleural hairs, and postalar tufts of hairs that are particularly prominent in dorsal view.

Distribution. The species is known in Canada only in a few collections in southern Ontario (Map 80), which form part of an isolated population well separated from the main distribution centre in the southeastern United States as plotted by Pechuman et al. (1983). Collection dates of the Ontario specimens are from early to mid July.

Tabanus atratus Fabricius

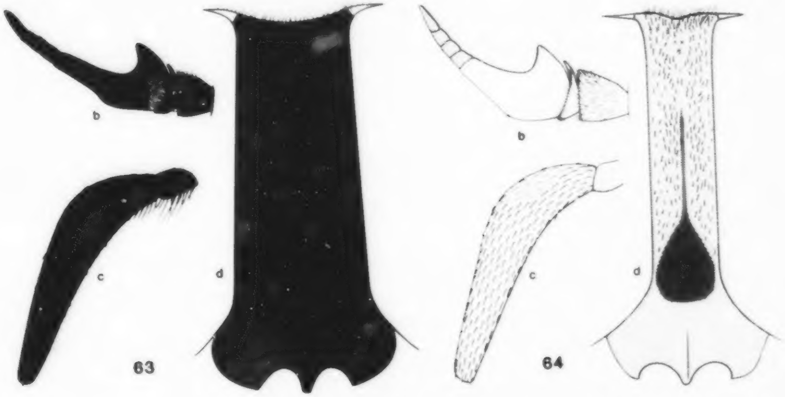
Fig. 63; Map 81

Tabanus atratus Fabricius, 1775:789.
Tabanus americanus Drury, 1773:2 (preocc.).
Tabanus niger Palisot de Beauvois, 1806: 54.
Tabanus validus Wiedemann, 1828:113.

Female. Length 20–27 mm. Eye bluish black, with darker median and ventral transverse bands. Frons relatively broad, 2.3–2.5 times as high as basal width, usually slightly narrowed above, thinly pruinose except for denuded calli; basal callus subrectangular, narrower than frons, joined to narrow median callus. Subcallus mostly denuded and glossy. Clypeus and gena subshiny, especially mediad of tentorial pits. Antenna relatively slender; basal flagellomere with prominent dorsal projection and deep dorsal excavation. Second palpomere 4–4.4 times as long as greatest width (Fig. 63).

Thorax, abdomen, and legs black; scutum sometimes dark brown; abdomen often with grayish white pruinose bloom dorsally. Wing uniformly dark brown.

Male. Black coloring identical to female. Head hemispherical. Eye very large, dorsally comprising mainly large ommatidia; smaller ommatidia on narrow dorsolateral borders and wider ventral border. Antenna of similar shape to that of female. Second palpomere subovoid, bluntly pointed apically.

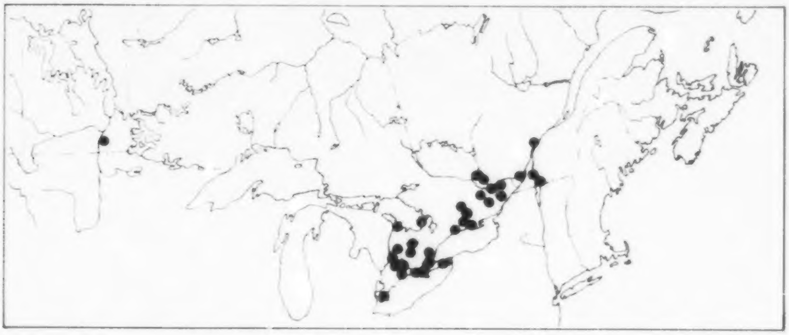


Figs. 63, 64. Head features of *Tabanus atratus* (63) and *T. calens* (64).

Remarks. This species is said to be the blue tail fly of folk song fame, a descriptive name since the whitish surface frosting on the black abdomen does appear blue in a certain light. Although it has never been abundant in Canada, its direct attack and loud flight noise can cause considerable disturbance among cattle.

Larvae have normally been found on the banks of slow-moving streams, farm ponds, or drainage ditches having little or no herbaceous vegetation and almost always in a substrate having abundant mineral soil constituents.

Distribution. *Tabanus atratus* is primarily restricted to southern and eastern Ontario and southern Quebec, but one specimen has been seen in St. Elizabeth, Man. (Map 81). These are the extreme northern limits of the species range, which covers essentially all of eastern United States east of a line from North Dakota to Texas. The flight season is quite long, collections having been made from 20 May to 14 August.



Map 81. Collection localities of *Tabanus atratus*.

Tabanus calens Linnaeus

Fig. 64

Tabanus calens Linnaeus, 1758:601.
Tabanus giganteus De Geer, 1776:226.
Tabanus lineatus Fabricius, 1781:455.
Tabanus pallidus Palisot de Beauvois, 1809:100.
Tabanus bicolor Macquart, 1847:37.
Tabanus coesiofasciatus Macquart, 1855:52.

Female. Length 22–24 mm. Eye dark bluish, lacking transverse bands. Frons 4.2–4.8 times as high as basal width, parallel-sided, yellowish pruinose; basal callus reddish, slightly narrower than frons, attenuated above, where connected with slender median callus. Subcallus yellow pruinose. Clypeus and gena whitish pruinose, mainly white-haired. Antenna yellowish orange, rather slender; basal flagellomere with prominent dorsal projection and excavation. Second palpomere about four times as long as greatest width, yellowish brown, mainly black-haired, with yellow hair on anterior edge especially at basal curvature (Fig. 64).

Thorax with scutum brownish, the scutum having faint longitudinal lines; pleura and coxae whitish pruinose, mainly with white hairs; anepisternum with some black or brownish hairs; scutellum with posterior margin reddish. Legs reddish; tarsi blackened; hind tibial fringe well developed, black. Wing pale brown; costal cell darker.

Abdomen dark reddish brown to black, with median row of small patches of yellow hairs on posterior margin of tergites, but frequently rubbed off on older specimens. Sternites with posterior margins pale pruinose, with white hairs; these white margins very narrow medially, wider laterally.

Male. Similar to female except as follows: Body with pale hairs more yellowish. Eye with upper median ommatidia only slightly larger, the line of differentiation indistinct. Second palpomere oval, about twice as long as wide, truncate apically, with long black hairs. Abdomen with venter having median darker stripe or series of spots on each segment that contrast with sides.

Remarks. *Tabanus calens* is most similar in size and body coloration to *T. catenatus* Walker, but the two are readily differentiated by the color and configuration of the antenna, which is completely yellow orange and with acute dorsal angle in *T. calens* and apically blackened with weaker dorsal angle of about 90° in *T. catenatus*. In addition, the abdomen of *T. catenatus* is paler, dark brown rather than black, with rather prominent, though small, median, white pruinose, white-haired triangles on each tergite.

Males of *T. catenatus* show substantial size differentiation of the eye facets, whereas there is little difference in *T. calens*.

A larva of *T. calens* was found in damp lowland pasture sod (Teskey 1969), a habitat where *T. quinquevittatus* Wiedemann and *T. sulcifrons* Macquart have been collected.

Distribution. The Canadian distribution of this species is confined to the counties of Essex and Kent in southern Ontario, all specimens being collected in August. However, *T. calens* is widely distributed over much of the eastern half of the United States, except for Florida and the Gulf Coast States.

Tabanus catenatus Walker

Fig. 65, Map 82

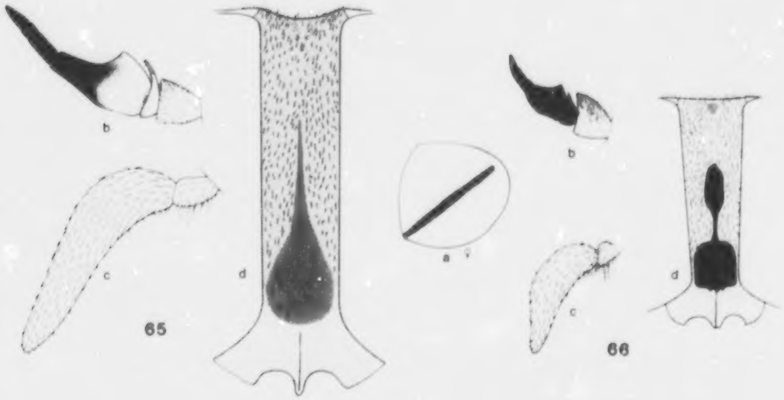
Tabanus catenatus Walker, 1848:148.
Tabanus orion Osten Sacken, 1876:442.

Female. Length 19–25 mm. Eye bare, unpatterned. Frons brown pruinose, four to five times as high as basal width, usually slightly widened above; basal callus reddish brown, slightly narrower than frons, gradually tapered above to fuse with slender median callus. Subcallus grayish yellow, pruinose. Clypeus and gena whitish pruinose, with mainly white hairs. Antenna mainly black, with scape, pedicel, and base of flagellum orange red; basal flagellomere about two-thirds as broad as long, with angle of dorsal projection nearly 90° and with shallow dorsal excavation. Second palpomere light brown, 3.5–4.2 times as long as greatest width, mainly black-haired, with pale hairs intermixed and dominant at anterobasal angle (Fig. 65).

Thorax brown; scutum with reduced pruinosity, faint longitudinal stripes, and black and whitish hairs; pleura and coxae whitish pruinose, with white hairs. Legs reddish brown; femora and tibiae mainly white-haired; hind tibial fringe weak. Wing membrane faintly pigmented bordering veins; costal cell darker.

Abdomen brown dorsally and predominantly black-haired, with posteromedian, whitish pruinose white-haired triangular spots; posterolateral margins of tergites also with white hairs. Abdomen with venter having brown stripe on median third and more reddish laterally. Sternites with posterior margins narrowly whitish pruinose.

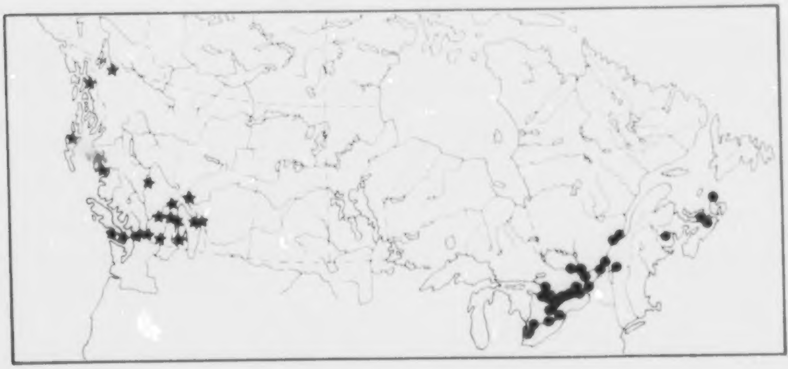
Male. Similar to female except pale hairs of body more yellowish. Eye with upper median area of large ommatidia distinctly differentiated from adjacent areas of smaller ommatidia. Second palpomere subovoid, about twice as long as wide, mainly black.



Figs. 65, 66. Head features of *Tabanus catenatus* (65) and *T. fairchildi* (66).

Remarks. Although this species is the same size and general coloring as *T. calens* Linnaeus, it is most similar to *T. novaescotiae* Macquart, from which it is readily distinguishable only by the key characters.

Pechuman (1981) suggested that the larva is probably terrestrial, based on the finding of a pupa in sod in a hardwood forest.



Map 82. Collection localities of *Tabanus catenatus* (●) and *T. fratellus* (★).

Distribution. As shown in Map 82, *T. catenatus* is present throughout much of southern and eastern Ontario and southern Quebec, with two collections in the Maritime Provinces. The range of this species extends south to North Carolina, to the Appalachian Mountains and east of them. Collection dates in Canada range from early July to 11 September.

Tabanus fairchildi Stone

Fig. 66

Tabanus fairchildi Stone, 1938:63

Female. Length 13–16 mm. Eye bare or with sparse, minute hairs, green, with single diagonal dark stripe (Fig. 66*a*). Frons 3.4–4.0 times as high as basal width, widened above, grayish to brown pruinose with black hairs; basal callus dark brown to black, nearly width of frons; median callus about a third width of frons, with narrow connection to basal callus; vertex usually denuded medially. Subcallus and adjacent parts of gena brown pruinose, with black hairs; hairs on subcallus few and situated laterally, sometimes absent; remainder of gena and clypeus white pruinose, white-haired. Scape brown, with strong dorsal projection bearing dense short black hairs; scape about equal in size to approximately square black basal flagellomere. Second palpomere creamy yellow, 2.8–3.2 times as long as greatest width, rather evenly curved dorsally, with mixed black and white hairs (Fig. 66).

Thorax dorsally black, with paler longitudinal lines medially and brown laterally, including notopleural lobes; thorax mainly yellow and black-haired but with tufts of white hairs in supra-alar region. Pleura lighter brown dorsally, black ventrally, and together with coxae whitish pruinose and predominantly white-haired; anepisternum sometimes with sparse black hairs. Leg segments mostly brown with white hairs; apex of fore tibia and all tarsi darkened, with black hairs; anterior face of fore femur black-haired. Wing membrane clear.

Abdomen dorsally black, with median row of whitish pruinose white-haired triangles and sublateral rows of round to oblique pale brownish or reddish patches also usually bearing white hairs; tergites with posterolateral margins white-haired. Sternites grayish black, black-haired medially, white-haired laterally and on incisures.

Male. Similar to female. Eye with short scattered hairs, areas of large and small ommatidia weakly differentiated. Palpus stout, blunt apically. Abdomen with about lateral third of tergites 1–3 white-haired, including paler sublateral patches; anterior sternites completely white-haired.

Remarks. *Tabanus fairchildi* is similar to *T. vivax* Osten Sacken and was confused with it before the former was described. It also has a close resemblance to *T. fulvicallus* Philip. However, characters given in the key should be adequate for distinguishing the three. Differences in the dorsal curvature of the second palpomere should help in separating females of *T. fairchildi* from those of *T. fulvicallus*.

Tabanus fairchildi is one of only three known species in North America whose larval stages are spent among stones and gravel in swiftly flowing streams. Egg masses are laid on stones and other objects projecting above the riffles, often with many egg masses laid on the same object. Mature larvae migrate to the banks of the stream, above water level, to pupate.

Distribution. The species is known in only three localities in Ontario (Guelph, Port Credit, and Smoky Falls), with collection dates in July and early August, and from a Quebec record mentioned by Pechuman (1964). It is widely distributed over much of the eastern half of the United States.

Tabanus fratellus Williston

Fig. 67; Map 82

Tabanus fratellus Williston, 1887:140.
Diachlorus (?) *haematopotides* Bigot, 1892:624.

Female. Length 8–12 mm. Eye with short sparse microscopic hair, purplish, with 4 greenish blue transverse stripes (Fig. 67*a*). Frons 3–3.7 times as high as basal width, usually distinctly widened above, gray; basal callus black, subquadrate; median callus round to oval, of nearly equal size. Subcallus, clypeus, and gena mostly gray pruinose, white-haired; gena brownish-tinged dorsally and with some black hair. Antenna with scape and pedicel black; flagellum more or less reddish orange; basal flagellomere about three-fifths as wide as long, with almost no dorsal angle; usually only 3 terminal flagellomeres present, although fourth sometimes evident, about equal in length to width of basal flagellomere. Second palpomere white to pale yellow, mostly black-haired, three to four times as long as greatest width (Fig. 67).

Thorax black, including notopleural lobe; scutum mainly white-haired, with usual narrow gray pruinose stripes; pleural surface grayish pruinose, white-haired. Legs mostly black to dark brown; tibiae with basal half, or more, paler. Wing membrane clear; basicosta with sparse black hair.

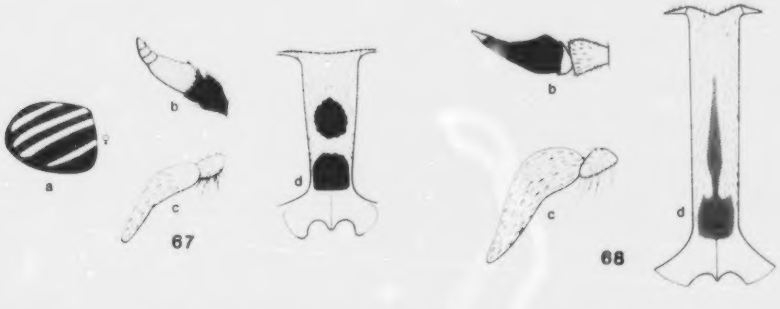
Abdomen dominantly black including hairs; segments with posterior margins narrowly whitish pruinose, white-haired; some or all of tergites 2–5 with median and sublateral patches of white pruinosity and white hair near middle of tergites, the median white patches often more linear and connected to posterior white hind margin.

Male. Similar to female as follows: eye with large upper median area of distinctly enlarged ommatidia; second palpomere moderately lengthened, tapered apically with long, mostly white hairs; legs more uniformly darkened but more white hairs basally on tibiae.

Remarks. This species and three in Europe, Turkey, and China have been placed under the group name of *Glaucops* Szilady, which has been treated as a full genus or a subgenus of *Tabanus* (Philip 1965; Stone 1938; Pechuman and Teskey 1981). This decision was based on the presence of only 3 terminal flagellomeres, whereas 4 is the usual number in other species of *Tabanus*, and the absence of hairs on the basicosta. However, as there are distinct black hairs on the basicosta of *T. fratellus*, possibly fewer than in other species, and as some specimens show 4 apical flagellomeres, it is judged that there is no basis for the special distinction.

Tabanus fratellus is similar to *T. pumilus* Macquart and *T. sparus* Whitney, differing as outlined in the keys and by the pattern of the eye color as well.

Larvae of *T. fratellus* were found in wet moss in a grassy forest meadow with scattered trees and shrubs near Kananaskis, Alta., on the western slopes of the Rocky Mountains (Teskey 1985). The larva also shows resemblance to that of *T. sparus* as well as to those of some *Atylotus* species.



Figs. 67, 68. Head features of *Tabanus fratellus* (67) and *T. fulvicallus* (68).

Distribution. The only Canadian records that I have seen are from southern British Columbia and southwestern Alberta (Map 82), but Middlekauff and Lane (1980) also record the species from the Yukon Territory, which helps to confirm previously reported collections in Alaska. The species is also present in Montana and Idaho, south to California. The flight period extends from late June to early September.

Tabanus fulvicallus Philip

Figs. 68, 190; Map 83

Tabanus fulvicallus Philip, 1931:106.

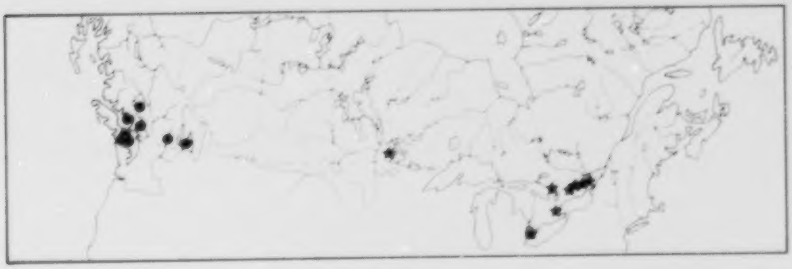
Female. Length 12–16 mm. Eye bare, with diagonal stripe similar to *T. fairchildi* Stone (Fig. 67) but much paler. Frons 4.4–5.0 times as high as basal width, slightly widened above, grayish brown pruinose; basal callus shiny, subquadrate, narrowly connected to slender lenticular median callus; vertex deeply notched with side flanges swollen. Subcallus and adjacent parts of gena pale brownish pruinose; remainder of gena and clypeus white pruinose with white hairs. Antenna with base of basal flagellomere, apical flagellomere, scape, and pedicel brown; remainder of flagellum black; basal flagellomere with obtuse dorsal angle and shallow dorsal excavation. Second palpomere creamy white, 3.0–3.7 times as long as greatest width, white-haired basally, with some black hairs apically (Fig. 68).

Thorax brown, scutum with faintly paler longitudinal stripes. Pleura dominantly white-haired, with black hairs restricted to anepisternum. Legs brown; apex of fore tibia and all tarsi darker; hind tibial fringe weak. Halter yellowish. Wing membrane clear.

Abdomen (Fig. 190) brown; tergites with median and sublateral rows of pale spots; median spots whitish pruinose, white-haired, slender anteriorly, nearly crossing tergites and strongly flared at posterior margins of tergites; sublateral spots pale brown, round to oval, white-haired only on tergites 1–3. Sternites reddish brown, white-haired, with increasing black hairs medially on terminal 3 sternites.

Male. With upper median area of enlarged ommatidia not distinctly differentiated from areas of smaller ommatidia; second palpomere oval, blunt apically; body coloration and patterning as in female.

Remarks. The similarity of this species to *T. fairchildi* Stone and *T. vivax* Osten Sacken has been mentioned under the former species. The differently shaped median abdominal pale spots, narrower frons, pale apical flagellomere, and notch on the vertex of the head readily differentiate *T. fulvicallus*.



Map 83. Collection localities of *Tabanus fulvicallus* (★) and *T. kesseli* (●).

Larvae have been found in a sphagnum bog and in bog-like habitats (Teskey 1969). Larval similarities also support a close relationship with *T. vivax*.

Distribution. Philip (1947) gives the distribution of this species as Ontario, Minnesota, Michigan, and New York. Thus the Canadian distribution as shown in Map 83 is more understandable, in that the apparent disjunct Manitoba population is probably derived from Minnesota. The species appears to have a southern boreal distribution adjacent to the Great Lakes. Collections were made from mid June to mid August.

Tabanus kesseli Philip

Fig. 69; Map 83

Tabanus kesseli Philip, 1950*b*:117.

Female. Length 16–19 mm. Eye bare, without pattern. Frons 4.3–5 times as high as basal width, slightly widened above, dark brown; basal callus denuded, subshiny brown, oval to subquadrate, narrowly joined to slender median callus. Subcallus, clypeus, and gena dark brown, black-haired. Antenna black, except on base of basal flagellomere; basal flagellomere with dorsal angle about 90° and with shallow dorsal excision. Second palpomere black, 3–3.5 times as long as greatest width (Fig. 69).

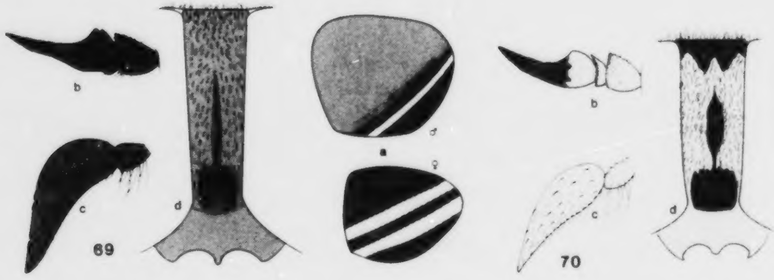
Thorax black; notopleural lobe and supra-alar lobes sometimes reddish. Legs dark brown to black; base of fore tibia sometimes paler. Wing vein margins and furcation of R_{4+5} lightly pigmented. Halter knob light brown.

Abdomen black; tergites with posterior margins having median row of small patches of white hairs in fresh specimens, but often rubbed off.

Male. Similar to female except eyes with dorsomedial area of enlarged ommatidia distinctly differentiated from adjacent smaller ommatidia; second palpomere oval, twice as long as diameter.

Remarks. This species is similar to *T. aegrotus* Osten Sacken, under which pertinent remarks related to both species are given.

Distribution. The species is found west of the Continental Divide, from southern British Columbia (Map 83) to Utah and California. Specimens in British Columbia were collected between mid June and mid September.



Figs. 69, 70. Head features of *Tabanus kesseli* (69) and *T. laticeps* (70).

Tabanus laticeps Hine

Fig. 70

Tabanus laticeps Hine, 1904:239.

Female. Length 12–15 mm. Eye short-haired, dark purplish, with 2 greenish bands (Fig. 70*a*). Frons 3–3.5 times as high as basal width, widened above, gray pruinose, brown-tinged beside median callus; basal callus shiny brown, subquadrate, not reaching eyes, narrowly joined to oval or elliptical, concolorous median callus. Vertex with large brownish black denuded area. Subcallus and upper gena yellowish brown, the former with pruinosity thin or partly absent. Clypeus and remainder of gena white pruinose, with black and white hairs. Antenna with scape, pedicel, and basal half of basal flagellomere reddish; remainder of flagellum black; basal flagellomere with obtuse dorsal angle and shallow excision. Second palpomere relatively stout, sharply pointed apically, about three times as long as greatest width, creamy white, predominantly white-haired, with hairs long ventrally (Fig. 70).

Scutum and scutellum grayish to black; scutum with faintly grayer longitudinal stripes, with recumbent golden hairs, and with longer erect black hairs; notopleural lobe reddish, black-haired. Pleura and coxae whitish pruinose, white-haired; remainder of legs brownish; fore femora, apex of fore tibia, and tarsi usually darker brown. Halter brown. Wing clear, lacking setae on vein Cu.

Abdominal tergites dark brown to black medially, brownish red to yellow laterally, with overriding median and sublateral paler markings; posterior margins with median patches of white hair or with median marking in form of gray pruinose; white-haired line widened in form of inverted T; tergites with sublateral oblique paler spots constituting groups of white hairs near middle; spots often narrowly connected with white hairs on posterolateral margins of tergites. Sternites reddish yellow to black with white hairs, except on terminal segments; black coloration usually restricted to middle of first two sternites and all terminal sternites; posterior margins narrowly yellow.

Male. Eye densely short-haired; upper median ommatidia moderately enlarged, with rather distinct line of separation from bordering smaller ommatidia; ventral area of smaller ommatidia with 1 narrow green stripe (Fig. 70*a*). Subcallus dark brown with upper half partly denuded.

Remarks. The major difficulty in identifying this species is in placing it in the proper genus. The hairy eyes of the female and denuded area at the vertex, although not swollen, appear little different from those of many species of *Hybomitra*. The male, despite its abundant eye hairs, shows its *Tabanus* affiliation by the ocellar tubercle being small, pruinose, and evenly short-haired. The bare Cu vein and fewer eye stripes provide additional evidence.

With its association to *Tabanus* established, *T. laticeps* can be confused only with *T. stonei* Philip which, however, is a grayish species, with median abdominal pale spots triangular rather than linear, and apparently inhabiting interior warm dry habitats.

Middlekauff and Lane (1980) indicate that larvae have been found in coastal marshes regularly inundated by the tides.

Distribution. *Tabanus laticeps* has been found in Canada only on Vancouver Island and some islands in the Strait of Georgia. All collections have been made in July. The species is present through the West Coast states to Baja California.

Tabanus limbatinevris Macquart

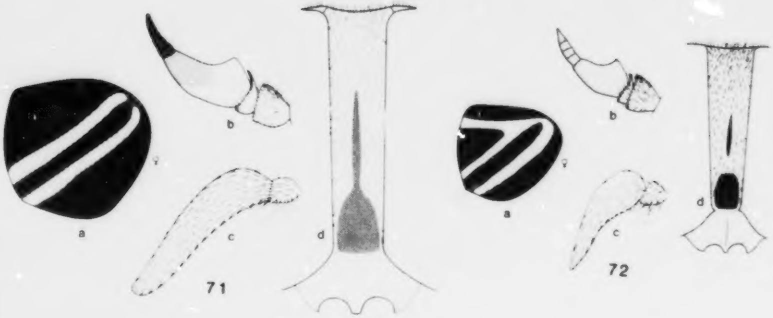
Fig. 71

Tabanus limbatinevris Macquart, 1847:32.

Female. Length 16–22 mm. Eye bare, dark bluish purple, with 2 transverse green stripes (Fig. 71*a*). Frons 4.5–6.5 times as high as basal width, slightly widened above, brownish pruinose, black-haired; basal callus black to pale brown, glossy, slightly narrower than frons, higher than wide, narrowly connected to slender concolorous median callus. Subcallus, clypeus, and gena gray pruinose, with white hairs. Antenna predominantly orange brown; terminal flagellomere usually moderately darkened; basal flagellomere 1.4–1.5 times as long as broad, with dorsal angle about 90° and distinct dorsal excision. Second palpomere about four times as long as greatest width, yellowish brown, with mostly black setae and some white setae basally (Fig. 71).

Scutum and scutellum grayish brown; scutum with paler longitudinal stripe bearing mainly yellow hairs; darker integument with black hairs. Pleura and coxae brown, with whitish pruinosity, mostly white-haired; basal half of fore tibia and all of mid and hind tibia yellowish, or remainder of legs brown. Halter brown. Wing membrane lightly pigmented, especially costal cell; crossveins and furcation of veins with darker spots; cell r_5 usually closed at wing margin or petiolate.

Abdomen orange to dark brown; tergites usually with middle portion dark brown; posterior margins paler, with distinct median row of white triangles; paler areas yellow-haired, with black hairs elsewhere. Sternum rather uniformly orange and yellow-haired.



Figs. 71, 72. Head features of *Tabanus limbatinevris* (71) and *T. lineola* (72).

Male. Similar to female, except eye with 2 greenish bands in lower area of smaller ommatidia.

Remarks. This species is similar to *T. sulcifrons* Macquart, differing essentially only in the closure of cell R_5 and its narrower frons. Larvae of this species, mistakenly identified as *T. sulcifrons*, were found in the wet grassy banks of a shallow drainage ditch traversing a wood lot (Teskey 1969).

Distribution. The species is known in Canada only from a few specimens, including the above reared one, collected in Essex, Kent, and Lambton counties of southern Ontario. Collection dates were from late July to mid August. The species is widely distributed throughout much of the eastern United States to Illinois, Missouri, and eastern Texas, except for Florida and southern parts of adjacent states and much of the New England States.

Tabanus lineola Fabricius

Fig. 72; Map 84

Tabanus lineola Fabricius, 1794:369.

Female. Length 10–15 mm. Eye bare, bluish purple, with 2 diagonal green stripes; stripes from near median ventral angle, the upper stripe joined laterally by third stripe from dorsomedial part of eye, forming a V-shaped configuration (Fig. 72*a*). Frons five to six times as high as basal width, 1.5–2 times as wide above as below; basal callus narrower than frons, higher than wide, sometimes narrowly connected to linear median callus. Subcallus and upper part of gena yellowish brown pruinose; gena with black hairs; remainder of gena and clypeus whitish pruinose, white-haired. Antenna orange; apex of flagellum often slightly darkened; basal flagellomere with obtuse dorsal angle and shallow dorsal excision. Second palpomere whitish, with black and white hairs, moderately swollen, about three times as long as greatest width (Fig. 72).

Scutum black, predominantly black-haired, with faint sublateral pair of pale lines behind transverse suture bearing whitish hairs; notopleural lobe more or less reddish; pleura and coxae whitish pruinose. Femora and apex of fore tibia and tarsi black; remainder of tibiae yellowish. Halter yellow. Wing clear.

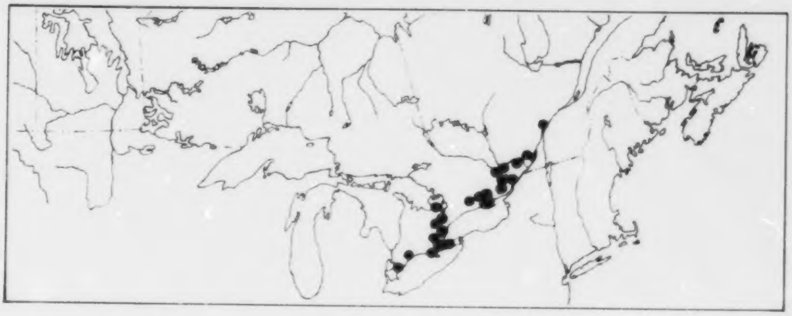
Abdomen black dorsally, with narrow median and sublateral white pruinose white-haired stripes; median stripe parallel-sided and extending length of abdomen; sublateral stripes on first 3 or 4 tergites. Sides of tergites and all sternites white pruinose, white-haired. Sternites with faintly darker median longitudinal stripe.

Male. Similar to female except as follows: eye bare, with dorsomedial area of paler and more greatly enlarged ommatidia; scutum with longer black hairs and abundant pale recumbent hairs; abdomen tending to more brown coloration laterally on tergites and sternites.

Remarks: *Tabanus lineola* is not frequently collected as an adult. The number of larvae that have been found (Teskey 1969) suggests that the adults are apparently more seclusive than rare, and the publication lists the variety of habitats in which larvae have been found.

This species is one of quite a number of rather similar species in the New World that are referred to as the *T. lineola* complex. Considerable taxonomic controversy has surrounded members of this complex, which Fairchild (1983) has greatly helped to clarify. Only two members of the complex as treated by Fairchild are known in Canada, the typical species and *T. similis* Macquart, and they are readily differentiated. Two other species with a similarly striped abdominal pattern, but readily differentiated by other characters, are *T. nigrovittatus* Macquart and *T. quinquevittatus* Wiedemann.

Distribution. This species has been collected in Canada only from southern and eastern Ontario and southern Quebec (Map 84), these being the northern extremity of an extensive continental range covering almost the eastern half of the United States. Canadian collections were made from mid June to near the end of August.



Map 84. Collection localities of *Tabanus lineola*.

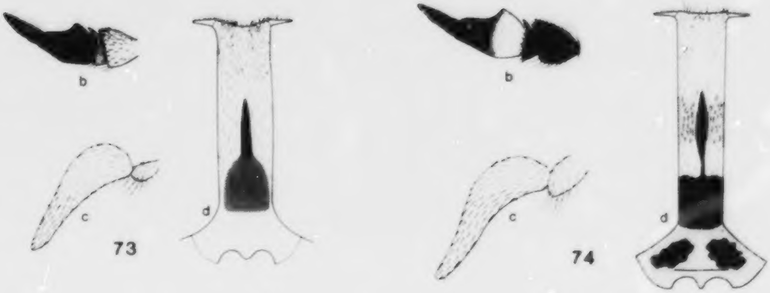
Tabanus marginalis Fabricius

Figs. 73, 179; Map 85

Tabanus marginalis Fabricius, 1805:99
Tabanus nivosus Osten Sacken, 1876:445.

Female. Length 11–15 mm. Eye bare, with faintly darker abbreviated diagonal stripe. Frons 3.3–4 times as high as basal width, nearly parallel-sided; basal callus narrower than frons, usually more or less brownish, broadly joined to black median callus; basal and median callus with surface wrinkled and subglossy. Subcallus yellow pruinose. Clypeus and gena mostly white pruinose, white-haired. Antenna with scape yellowish to brown; pedicel and flagellum black; basal flagellomere 1.1–1.5 times as long as greatest width, with obtuse dorsal angle and little, if any, dorsal excision. Second palpomere pale yellowish, 3.0–3.8 times as long as greatest width, with white hair dominant basally (Fig. 73).

Scutum black, with narrow median brownish stripe and broader sublateral and lateral whitish pruinose stripes; notopleural lobe reddish; pleura and coxae whitish pruinose, white-haired except on anepisternum. Femora and tarsi black; tibia yellowish, except for dark apices. Halter brown. Wing clear.



Figs. 73, 74. Head features of *Tabanus marginalis* (73) and *T. nigripes* (74).

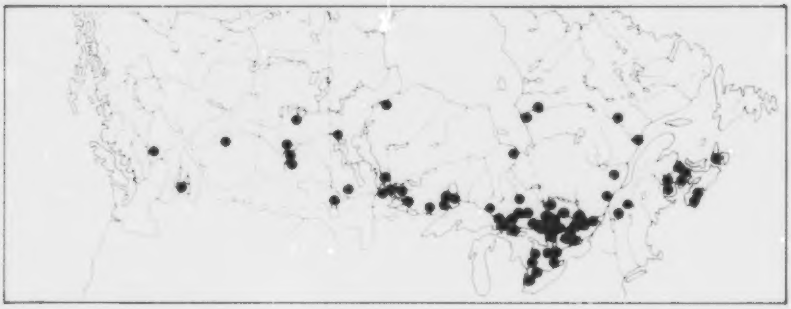
Abdomen dominantly black, with pale areas white-haired and remainder black-haired; tergites 2–4 or 5 with posteromedial triangles and sublateral patches; triangles small, white, pruinose, white-haired; sublateral patches larger, similarly colored, oblique, crossing at least tergites 2 and 3 (Fig. 179). Sternites predominantly black, with reddish tinge anteriorly, and white-haired; posterior margins narrowly paler.

Male. Similar to female except as follows: areas of large and small ommatidia moderately well differentiated, the ventral line of change with yellowish transverse stripe; second palpomere about 2.5 times as long as broad, pointed apically; basal flagellomere more slender, less than width of scape; sides of abdominal tergites, including oblique pale patches, often yellowish orange in ground color.

Remarks. The most distinctive diagnostic feature of *T. marginalis* is the sublateral abdominal pale patches that are much larger than the median ones. Only *T. reinwardtii* Wiedemann approaches this appearance, but that species is readily differentiated by dark spots on crossveins and bifurcations of veins.

Adults of *T. marginalis* are not frequently collected, but I found their larvae, which occurred in almost all types of wetland habitats, to be the most common among the larvae of all Tabaninae collected (Teskey 1969).

Distribution. This species has been found in all provinces except Prince Edward Island and Newfoundland (Map 85), with collection dates extending from early June to late August.



Map 85. Collection localities of *Tabanus marginalis*.

The continental distribution encompasses all states bordering the Great Lakes and the Atlantic Ocean to Virginia, and then along the Appalachian Mountains to northern Georgia, whereas in the west the species follows the Rocky Mountains to Colorado.

Tabanus nigripes Wiedemann

Figs. 74, 177; Map 86

Tabanus nigripes Wiedemann, 1821:25.
Tabanus coffeatus Macquart, 1847:39.
Tabanus winthemi Krober, 1931:295.

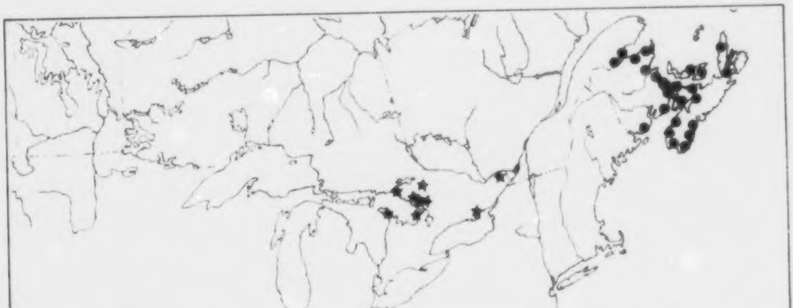
Female. Length 11–14 mm. Eye bare, without pattern. Frons 4.7–5.3 times as high as basal width, usually slightly widened above, black, with grayish pruinosity and black hairs. Frontal calli mahogany to black; median callus linear, connected to subquadrate basal callus; basal callus usually as wide as frons. Subcallus brownish black, rather swollen, sparsely pruinose and subglossy. Clypeus and gena mostly white pruinose, white-haired. Antenna dark brown to black, except more reddish on base of flagellum; basal flagellomere 1.2–1.4 times as long as wide, with little or no dorsal excavation. Second palpomere 3.2–3.9 times as long as greatest width, creamy white to yellow, usually white-haired basally (Fig. 74).

Thorax black; scutum with 4 gray pruinose whitish-haired longitudinal stripes separated by subglossy black stripes; notopleural lob[illegible]ddish; pleura gray pruinose, mostly white-haired. Legs mostly bl[illegible]. Wing membrane clear.

Abdomen black with white pruinose white-haired markings in the form of median triangles; triangles nearly crossing tergites and narrowly bordering tergal margins laterally and posterolaterally (Fig. 177). Sternites with narrow white posterior margins.

Male. Similar to female except as follows: Eyes with upper median area of grayish ommatidia sharply separated from bordering area of smaller black ommatidia. Antenna more slender. Frontoclypeus and genae dark pruinose, black-haired. Thorax, legs, and most of abdomen black-haired. White hairs on abdomen associated with gray pruinose posterior margins of tergites, the white hair expanding into median triangles; median triangles sometimes accentuated.

Remarks. Larvae have been found only under the acidic conditions of sphagnum and cranberry bogs and bog-like backwaters of streams (Teskey 1969).



Map 86. Collection localities of *Tabanus nigripes* (★) and *T. nigrovittatus* (●).

Distribution. In Canada the species is known only in the southern boreal regions of Ontario (Map 86), where collections have been made only in July and early August. It has a very extensive range over much of the eastern United States (Pechuman et al. 1983).

Tabanus nigrovittatus Macquart

Figs. 75, 174; Map 86

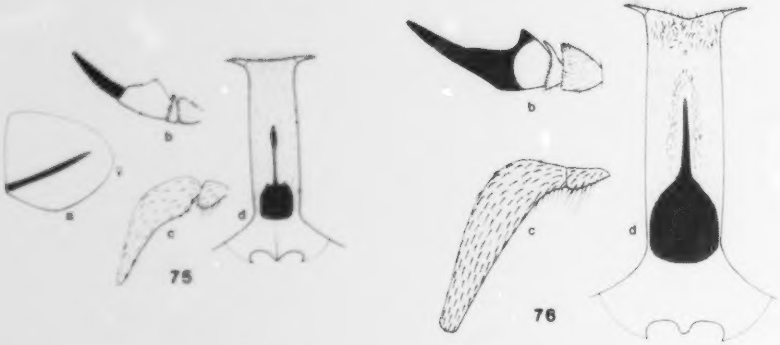
Tabanus nigrovittatus Macquart, 1847:40.
Tabanus vicarius Walker, 1848:187.
Tabanus allynii Marten, 1883:110.
Tabanus floridanus Szilady, 1926:24.
Tabanus simulans Walker, 1848:182.

Female. Length 8–14 mm. Eye bare, bright green, with narrow dark diagonal stripe (Fig. 75*a*). Frons 3–4 times as high as basal width, parallel-sided, grayish to yellow pruinose; basal callus shiny dark brown, subquadrate, narrower than frons; median callus concolorous with basal callus, oval to linear, sometimes narrowly connected to basal callus or almost obsolete. Subcallus grayish yellow pruinose. Clypeus and gena white pruinose, white-haired. Antenna mainly yellow, 1.1–1.4 times as long as greatest width, with obtuse dorsal angle and very shallow excision; terminal flagellomere black. Second palpomere creamy white, 3.2–3.8 times as long as greatest width, with black and white hair (Fig. 75).

Scutum, including notopleural lobe and scutellum, gray with recumbent yellow hair and more erect black hair; pleura and coxae grayish pruinose, white-haired. Femora, tarsi, and apical half of fore tibia black; remainder of tibiae yellow. Halter yellow. Wing with costal cell yellowish.

Abdomen dorsally with a median black stripe overridden by a narrower median gray stripe; black stripe one-third width of abdomen, first 3 tergites with sides orange; remaining tergites with sides having sublateral stripes or series of orange spots; tergites with median gray stripe and lateral paler areas yellow-haired; tergites with submedian black stripes black-haired (Fig. 174). Sternum predominantly grayish-black; sternites 2 and 3 with sides orange; sternites yellow-haired except for sternite 7.

Male. Similar to female except as follows: Eye with dorsomedial area of moderately enlarged ommatidia; boundary with areas of smaller ommatidia not sharply differentiated except by color; area of enlarged ommatidia often distinctly paler in dried specimens. Second palpomere slightly over twice as long as wide, pointed apically, mainly-white haired; scutal hairs longer.



Figs. 75, 76. Head features of *Tabanus nigrovittatus* (75) and *T. novaescotiae* (76).

Remarks. *Tabanus nigrovittatus* breeds in eastern coastal salt marshes, often in great abundance. The close proximity of these breeding grounds to coastal recreational facilities and livestock farms, coupled with the rapacious habits of the species, can result in considerable economic loss. Because of the species' importance, especially in coastal regions of the United States, much has been written on its biology, behavior, and control, as well as on protection from its bite.

Tabanus nigrovittatus is similar to *T. quinquevittatus* Wiedemann. Apart from the fact that the latter would not likely be found in a salt marsh, nor the former outside one, the two are readily distinguishable by the characters given in the key.

Distribution. The species has been collected from the eastern coastal regions of Canada, shown in Map 86, and along the entire Eastern Seaboard and Southern Seaboard of the United States to Texas. The Canadian collections were made from early July to mid August.

Tabanus novaescotiae Macquart

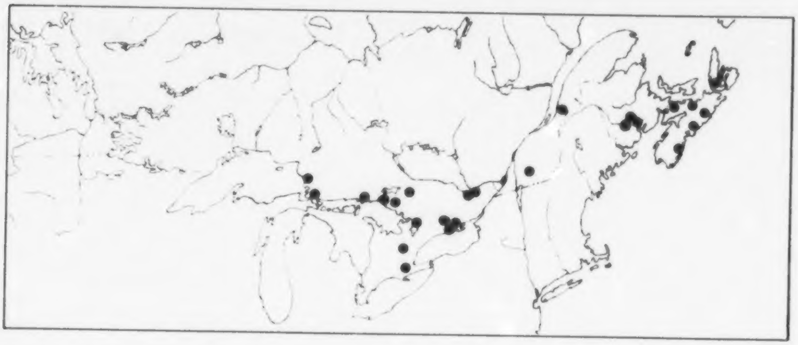
Fig. 76; Map 87

Tabanus novaescotiae **Macquart, 1847:40.**
Tabanus actaeon **Osten Sacken, 1876:443.**

Female. Length 17–22 mm. Eye bare, unpatterned. Frons 3.2–4.2 times as high as basal width, parallel-sided to slightly widened above, grayish pruinose, with tinges of yellow beside median callus; basal callus reddish brown, nearly as wide as frons, narrowed above to fuse with slender median callus. Subcallus grayish yellow pruinose. Clypeus and gena mainly whitish pruinose and white-haired, except for some black hair dorsally. Antenna mainly black, with scape, pedicel, and usually base of first flagellomere reddish orange; first flagellomere 1.4–1.7 times as long as greatest width, with acute dorsal angle and prominent dorsal excavation. Second palpomere brown, with black hair, 4–4.7 times as long as greatest width, rather blunt apically (Fig. 76).

Thorax predominantly brownish; pleura with ventral areas blackened; scutum with paler longitudinal stripes and, like scutellum, with recumbent golden hairs and erect black hairs. Legs brown; basal half of fore tibia and all of mid and hind tibiae yellowish. Halter pale brown. Wing clear, except for faintly yellowed costal cell.

Abdomen brown; tergites with median row of whitish triangles on posterior margins extending to no more than half the length of each tergite; posterior margins whitish laterally, with whitish areas white-haired and other areas black-haired. Sternites reddish brown, slightly whitish pruinose, black-haired, with no apparent median pale pruinosity, thus forming a prominent broad dark stripe; sternites white-haired on lateral third.



Map 87. Collection localities of *Tabanus novaescotiae*.

Male. Similar to female, except upper median area of enlarged ommatidia distinctly differentiated from adjacent areas of small ommatidia.

Remarks. The similarity of *T. novaescotiae* to *T. catenatus* Walker and the features for separating the two are given under the latter and in the key.

Teskey and Burger (1976) found larvae in a sphagnum bog, reared them, and described the immature stages.

Distribution. As shown in Map 87, *T. novaescotiae* is present throughout much of southern and eastern Ontario and southern Quebec. Two collections have been made in the Maritime Provinces. Collection dates range from early July to 11 September. The species' range extends south to North Carolina, to the Appalachian Mountains, and east.

Tabanus pumilus Macquart

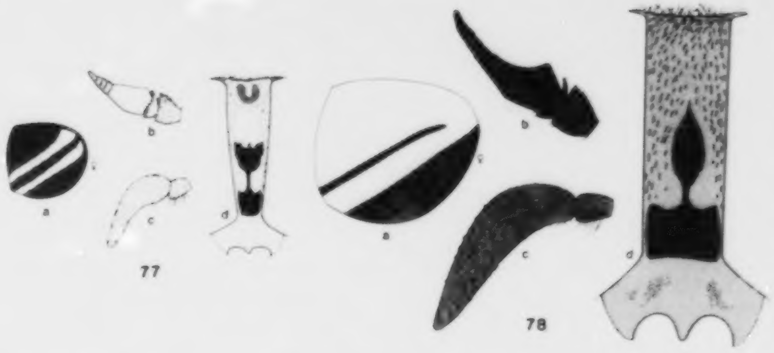
Figs. 77, 185; Map 88

Tabanus pumilus Macquart, 1838:150.

Female. Length 8–10 mm. Eye bare, dark bluish purple, with 2 green transverse bands in life (Fig. 77*a*). Frons five to six times as high as basal width, strongly widened above, grayish pruinose; basal callus glossy black, subquadrate, narrower than frons, sometimes narrowly connected to median callus; median callus oval, round or subquadrate, black, often subequal in size to basal callus; vertex usually with some denudation. Subcallus and adjacent parts of gena brownish pruinose; clypeus and remainder of gena white pruinose and white-haired. Antenna orange; terminal 4 flagellomeres black; basal flagellomere with obtuse dorsal angle and no dorsal excision. Second palpomere white, with black and white hair, 3–4 times as long as greatest width.

Scutum and scutellum black; scutum with faint longitudinal gray stripes, recumbent golden hair, and erect black hair; notopleural lobe, postpronotal lobe, and upper part of anepisternum pale brown, white-haired, with whitish pruinosity; remainder of pleura black. Legs brown. Halter brown. Wing membrane clear.

Abdomen dark brown to black; posterior margins of all tergites, sublateral round spots on tergites 2–6, and diffuse median area on tergite 2 whitish pruinose (Fig. 185); tergites 2–6 with posterior margins laterally and medially; tergite 2 with sublateral spots of white hair; tergites black-haired elsewhere. Sternites more whitish pruinose laterally, dominantly white-haired, with slightly accentuating median dark stripe.

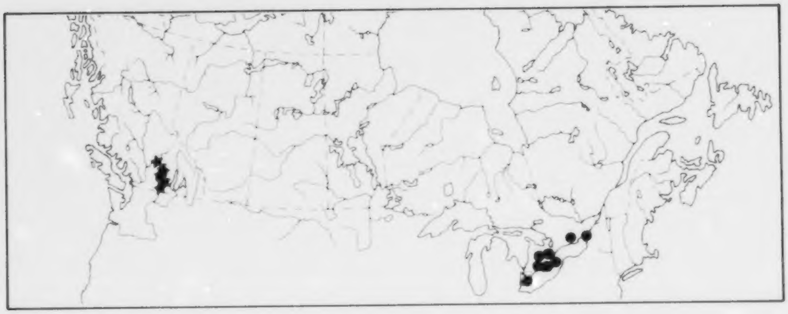


Figs. 77, 78. Head features of *Tabanus pumilus* (77) and *T. punctifer* (78).

Male. Similar to female except as follows: Eye with area of enlarged ommatidia occupying about three-quarters of eye surface; enlarged ommatidia distinctly differentiated in color and size from areas of small ommatidia; lower area of small ommatidia with 2 transverse narrow greenish stripes in life. Antenna with basal flagellomere slender, nearly twice as long as greatest width; frontal triangle with transverse dark stripe across upper portion. Second palpomere about twice as long as greatest width, pointed apically.

Remarks. This species is among the smallest of the genus and is certainly the smallest in the Canadian fauna. Adults have been rarely collected here, which may be more indicative of their seclusive behavior than actual rarity, since a relatively large number of larvae have been found (Teskey 1969). The larvae were collected mostly in highly organic substrates of bogs and marshes but also in silty soil of a grassy, spring-fed seepage area.

Distribution. In Canada the species has been found only in Ontario (Map 88), this being the northern terminus of a range covering most of the United States east and south of Iowa, exclusive of the northern New England States and the southern half of Florida. Collection dates in Canada range from mid June to mid July.



Map 88. Collection localities of *Tabanus pumilus* (●) and *T. punctifer* (★).

Tabanus punctifer Osten Sacken

Fig. 78; Map 88

Tabanus punctifer Osten Sacken, 1876: 453

Female. Length 17–24 mm. Eye bare, in life with ventral quarter and narrow median transverse stripe dark purplish blue; remainder of eye green (Fig. 78*a*). Head integument dark brown to black. Frons 2.8–3.4 times as high as basal width, parallel-sided, sparsely pruinose; basal callus subquadrate, slightly less than width of frons; median callus oval to elliptical, at least one-third width of frons, often narrowly connected to basal callus. Subcallus sometimes irregularly denuded. Clypeus and gena black-haired. Antenna black; basal flagellomere with obtuse dorsal angle and shallow excision. Second palpomere black, 3.8–4.0 times as long as greatest width (Fig. 78).

Thorax, including legs and abdomen, mostly black and black-haired; scutum and scutellum, or rarely only their margins, strikingly grayish pruinose and white-haired. Base of fore tibia with white integument and white hair. Wing evenly pigmented; spot at furcation of R_{4+5} darker.

Male. Similar to female except as follows: Eye with upper median area of enlarged ommatidia sharply differentiated; second palpomere somewhat club-shaped, with long apical black hairs.

Remarks. This species is closely related to the eastern *T. stygius* Say, both species having very similar size and coloring. However, the frons of *T. stygius* is narrower and the basal flagellomere broader, in addition to other differentiating characters given in the key. Webb and Wells (1924), Lane (1976), and Burger (1977) have described the immature stages. Larvae were found in almost all types of natural or human-made wetland habitats, but were most often located in saturated soil on the margins of running or standing water. Egg masses are often laid on cattails.

Distribution. This species has been collected in Canada only in south-central British Columbia, primarily in the Okanagan Valley (Map 88), from 15 April to 29 July, but is a minor element in the fauna there. It is present over much of the western United States to the western border of the Dakotas, south to Texas and northern Mexico, and apparently becomes more of a problem species south of Oregon.

Tabanus quinquevittatus Wiedemann

Figs. 79, 173; Map 89

Tabanus quinquevittatus Wiedemann, 1821:34.
Tabanus costalis Wiedemann, 1828:173.
Tabanus manifestus Walker, 1850:41.
Tabanus baltimorensis Macquart, 1855:54.
Tabanus vicarius of authors, not Walker, 1848.

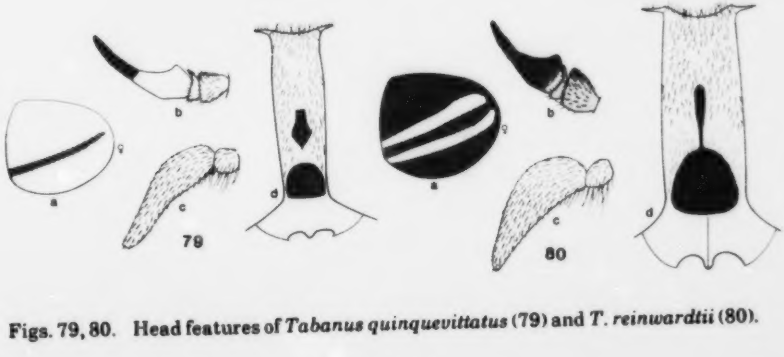
Female. Length 11–13 mm. Eye bare, green, with narrow transverse dark band (Fig. 79*a*). Frons 3.5–4 times as high as basal width, parallel-sided to slightly widened above, yellowish pruinose with black hair; basal callus dark brown, glossy, as wide as tall, rounded above, narrower than frons, sometimes narrowly connected to somewhat roundish variably sized median callus. Subcallus yellow. Antenna with scape and pedicel yellow, basal flagellomere orange, and apical flagellomeres black; basal flagellomere subequal to or shorter than apical flagellomeres, with obtuse dorsal angle and shallow dorsal excavation. Clypeus and gena mainly white pruinose with white hair. Second palpomere yellow, with yellow hair basally but mixed with black hair elsewhere, 3.4–3.9 times as long as greatest width (Fig. 79).

Thorax yellow pruinose, mainly yellow-haired; notopleural lobe more grayish with black hair. Legs with basal half of fore tibia and all of mid and hind tibiae yellow; remainder black to dark brown; femora and coxae grayish pruinose. Halter yellow. Wing with costal cell yellowish.

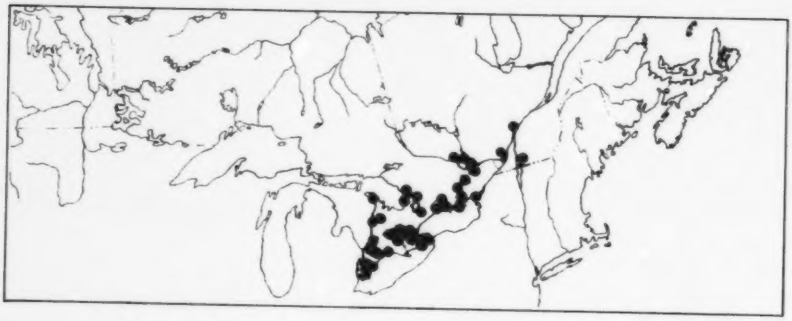
Abdomen dorsally (Fig. 173) with yellowish-orange; median portion of first 3 tergites and all of remaining tergites black, overlaid by narrow longitudinal median whitish pruinose stripe; median stripe, sublateral patches, and lateral margin yellow-haired; remainder of tergites black-haired. Sternum mainly yellow haired, yellowish orange; first 1 or 2 sternites and all terminal sternites black medially.

Male. Similar to female except as follows: Eye with area of enlarged ommatidia yellow in dried specimen and strongly differentiated in size from bordering black smaller ommatidia. Antenna more slender. Second palpomere long oval. Abdomen with black coloration greatly reduced, usually confined to terminal 2 or 3 segments, sometimes very narrowly bordering median pale stripe; sides of tergites extensively yellowish orange.

Remarks. This species is most similar to the coastal salt-marsh-breeding *T. nigrovittatus* Macquart, although readily differentiated by characters in the key. It is most abundant and frequently a severe pest of pastured livestock from mid July to August (Teskey 1960). Larvae of *T. quinquevittatus*, unlike those of most species of horse flies, are found in relatively dry soil, such as moist pasture and hay fields that would normally be too wet to cultivate in the spring (Logothetis and Schwardt 1948; Tashiro and Schwardt 1949; Teskey 1969). This may be the reason for its abundance, since such habitats would likely provide a much more extensive breeding ground than the continuously saturated wetlands inhabited by most species.



Figs. 79, 80. Head features of *Tabanus quinquevittatus* (79) and *T. reinwardtii* (80).



Map 89. Collection localities of *Tabanus quinquevittatus.*

Distribution. *Tabanus quinquevittatus* has been collected in southern and eastern Ontario and southern Quebec (Map 89), primarily in the prime agricultural areas. This region is near the northern corner of a triangular continental distribution, with Florida and Kansas at the other corners. Collections have been made from mid June to late August.

Tabanus reinwardtii Wiedemann

Figs. 80, 189; Map 90

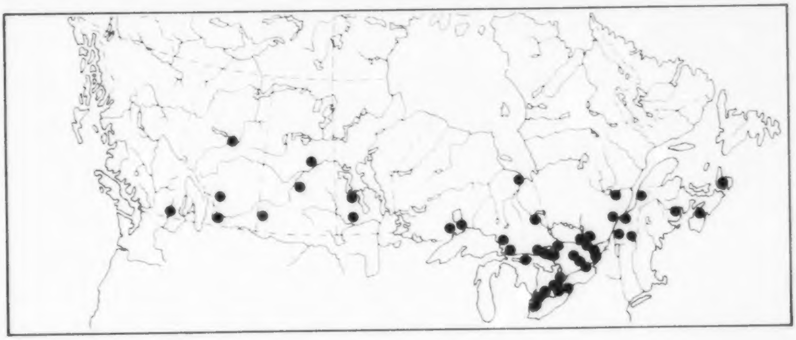
Tabanus reinwardtii Wiedemann, 1828:130.
Tabanus erythrotelus Walker, 1850:25.

Female. Length 13–18 mm. Eye bare to very sparsely short pilose, dark purplish, with 2 transverse greenish blue bands (Fig. 80*a*). Frons 2.4–2.7 times as high as basal width, slightly narrowed above, grayish pruinose, black-haired, darker beside median callus; basal callus glossy brown, as long as wide, narrower than frons, usually connected to slender median callus. Vertex notched. Subcallus white to yellowish pruinose. Frontoclypeus and gena white pruinose, dominantly white-haired. Antenna mostly black to dark brown; scape sometimes reddish brown; basal flagellomere 1.3–1.7 times as long as greatest width, with dorsal angle about 90°, and dorsal excision shallow. Second palpomere 3–3.2 times as long as greatest width, pinkish yellow, with mixture of white and black hair.

Scutum and scutellum black; scutum with gray to faintly reddish stripes bearing golden recumbent hairs; notopleural lobe and much of pleural integument orange; remainder of pleura black with white hair. Legs mostly orange brown; apex of fore tibia and all tarsi blackened. Halter brown. Wing mainly clear; crossveins and furcation of R_{4+5} with dark spots.

Abdomen black dorsally, with median row of small white triangles not crossing tergites and sublateral row of slightly oblique pale reddish spots crossing at least some tergites; pale areas and lateral margins white-haired. Sternites grayish laterally, with white hair and faintly blacker median stripe bearing black hair.

Male. Similar to female except as follows: Eye densely pilose, with dorsocentral area of slightly enlarged ommatidia; lower area of smaller ommatidia with single transverse greenish blue stripe in life. Second palpomere oval, blunt apically. Genal hairs black. Thoracic hairs long and dense. Sublateral pale areas on abdomen usually larger.



Map 90. Collection localities of *Tabanus reinwardtii*.

Remarks. The abdominal pattern of this species is similar to that of *T. marginalis* Fabricius. However, the dark spots on the wings clearly identify *T. reinwardtii*.

Larvae of *T. reinwardtii* were among the most commonly collected of all Tabaninae by Teskey (1969), yet adults are infrequently collected. Pechuman (1981) suggests that this anomaly is related to its retiring and nonagressive behavior, although it has been observed to occasionally attack livestock. Lavigne, Bloom, and Nay (1968) made other behavioral observations of *T. reinwardtii*, especially of mating and oviposition.

Distribution. *Tabanus reinwardtii* is present across the southern extremities of Canada, from Cape Breton to the Okanagan Valley (Map 90), and south to northern Georgia, Arkansas, and Wyoming. Collection dates range from mid June to 30 August, with most in July.

Tabanus sackeni Fairchild

Figs. 81, 186; Map 91

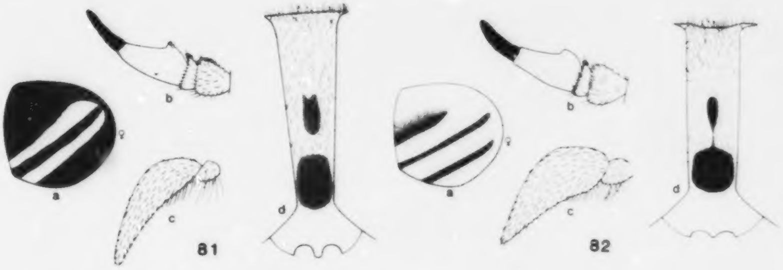
Tabanus sackeni Fairchild, 1934:141.

Female. Length 12–15 mm. Eye bare, dark purplish blue, with 2 greenish transverse bands (Fig. 81*a*). Frons rather narrow, five to six times as high as basal width, widened above, brownish to gray pruinose; basal callus subquadrate, dark brown, glossy, longer than wide, slightly narrower than frons, separate from median callus; median callus small, oval. Subcallus yellow to brown pruinose, although often abraded and subglossy. Clypeus and gena predominantly white pruinose, white-haired. Antenna relatively long, with short acute dorsal angle; scape and pedicel yellow; basal flagellomere orange; terminal flagellomeres black. Second palpomere white, with black and white hair, 3.3–4.0 times as long as greatest width (Fig. 81).

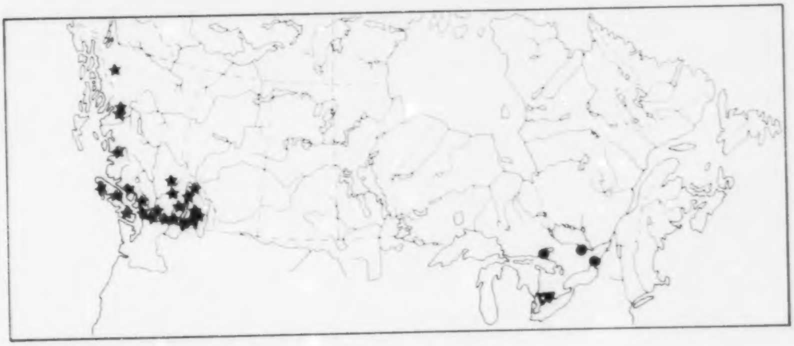
Thorax brown; scutum with faint longitudinal paler stripes; scutellum reddish; pleura whitish pruinose. Legs mostly brown; apex of fore tibia and all except base of mid and hind metatarsi darkened. Halter brown. Wing clear.

Abdominal tergites dark brown, with median and sublateral rows of yellow patches not reaching hind margins; median patches sublinear; lateral patches oval to round (Fig. 186). Sternites reddish brown, especially medially, predominantly white-haired, sparsely black-haired medially.

Male. Similar to female except as follows: Eye with dorsomedial area of enlarged ommatidia distinctly differentiated from adjacent area of small ommatidia; ventral area of small ommatidia with 2 narrow greenish stripes. Second palpomere oval, about twice as long as broad. Thoracic hair long, imparting distinct grayish appearance to scutum and scutellum and more whitish appearance to pleura. Abdomen with pale markings more discrete.



Figs. 81, 82. Head features of *Tabanus sackeni* (81) and *T. sagax* (82).



Map 91. Collection localities of *Tabanus sackeni*, *T. sagax*, and *T. sequax*.

Remarks. The general appearance of this species and *T. fulvicallus* is quite similar. However, the longer and distinctly bicolored antennal flagellum and the more linear median abdominal pale spots of *T. sackeni* are distinctive.

Tabanus sackeni has been collected under lights at least until midnight, but it attacks humans only at twilight (L.L. Pechuman, personal communication). This may explain the infrequency of its collection. Goodwin (1976) collected larvae under 10–18 cm of well-drained damp soil on a steep forested hillside.

Distribution. Only two Canadian specimens, collected on 20 August and 4 September in Elgin and Middlesex counties of southern Ontario, are known to me (Map 91). The continental distribution of the species extends from Iowa and Massachusetts to Georgia and Arkansas.

Tabanus sagax Osten Sacken

Fig. 82; Map 91

Tabanus sagax Osten Sacken, 1876:452.
Atylotus baal Townsend, 1895:58.
Tabanus dawsoni Philip, 1931:105.

Female. Length 13–15 mm. Eye bare, green, with 3 transverse bluish purple bands, the upper band incomplete (Fig. 82*a*). Frons 2.8–3.7 times as high as basal width, parallel-sided to slightly widened above, yellowish gray to brownish pruinose, black-haired; basal callus dark brown, glossy, subquadrate, slightly narrower than frons, usually narrowly connected to small oval median callus. Subcallus and upper margin of gena concolorous with frons, latter with black hairs. Clypeus and remainder of gena whitish pruinose, with white hair. Scape, pedicel, and basal flagellomere yellow to orange; terminal flagellomeres black; basal flagellomere about twice as long as greatest width, with short dorsal process and shallow excision. Second palpomere yellowish, 2.5–3.0 times as long as wide, rather sharply pointed apically, with mixture of black and whitish hairs (Fig. 82).

Scutum yellowish gray, with narrow median and sublateral brown stripes; notopleural lobe paler yellow; pleura whitish pruinose. Legs yellowish orange; fore tarsi or apical tarsomeres of all legs darker. Halter yellow. Wing with costal cell yellowed.

Abdomen broadly orange brown dorsally; tergites with slightly paler sublateral spots and median white stripe slightly expanding at posterior margins; white stripe and lateral margins white-haired, black-haired elsewhere. Sternites uniformly yellowish orange, with mainly pale hair; terminal 2 or 3 sternites with black hair medially.

Male. Similar to female except as follows: dorsocentral area of enlarged ommatidia sharply differentiated in size; smaller ommatidia not reaching vertex along outer margin; lower area of small ommatidia with single transverse greenish band. Second palpomere strongly swollen, with short apical point.

Remarks. This species has the body coloring and the slender bicolored flagellum of the preceding species. However, the more prominent median pale abdominal stripe, slightly widened posteriorly in each segment, and the wider frons of *T. sagax*, afford positive identification.

Pechuman (1981) suggests that this species, like *T. sackeni* Fairchild, may also be crepuscular. He also refers to an egg mass of this species being laid on a blade of grass in a dry, open field. The likelihood of the larval habitat being in relatively dry soil also suggests the close relationship of the two species.

Distribution. Three Ontario records of this species are the only ones known in Canada (Map 91). Collection dates were from 20 July to 8 August.

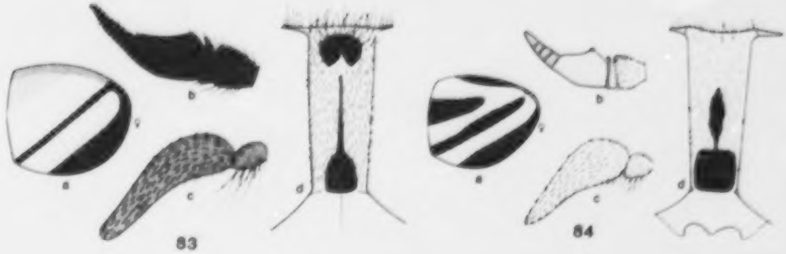
Tabanus sequax Williston

Figs. 83, 191; Map 91

Tabanus sequax Williston, 1887:137.
Therioplectes leucophorus Bigot, 1892:640.
Tabanus fuscipalpus Bigot, 1892:681.

Female. Length 12–16 mm. Eyes densely short pilose, with upper and lower margins and 2 narrow transverse median stripes black and intermediate areas dull bluish green (Fig. 83*a*). Frons parallel-sided to slightly widened above, 2.7–3.5 times as high as basal width; basal callus much narrower than frons; median callus slenderly attenuated dorsally. Vertex without distinct raised ocellar tubercle but with shiny denuded patch. Subcallus pruinose. Antenna black; basal flagellomere with obtuse dorsal angle and little or no dorsal excavation. Second palpomere blackish, 3.5–4.5 times as long as broad, evenly covered with black hairs; basal palpomere predominantly white-haired. Clypeus and gena grayish pruinose; clypeus mostly white-haired; gena dominantly black-haired dorsally (Fig. 83).

Thorax black, predominantly white-haired on pleural surfaces and black-haired dorsally; postalar callus and margin of scutellum white-haired. Wing with cross veins and bifurcation of R_{4+5} distinctly pigmented; vein Cu lacking setae.



Figs. 83, 84. Head features of *Tabanus sequax* (83) and *T. similis* (84).

Abdomen black; tergites with posterior margins whitish pruinose and white-haired, except submedially (Fig. 191), the median pale areas widened to shallow triangles. Sternites also with narrow paler caudal margins, but with white hairs more dominant posterolaterally.

Male. Similar to female except as follows: upper median ommatidia slightly larger but not sharply differentiated from small surrounding ommatidia; palpus pale brown, oval, about twice as long as broad; postocular fringe of hairs white.

Remarks. Philip (1965) placed this species in the genus *Hybomitra*, apparently because of its densely haired eyes. Remnants of ocelli on a slightly elevated ocellar tubercle, a primary diagnostic feature of *Hybomitra*, are not present in *T. sequax*. Setae on the dorsal surface of vein Cu are not present, again differing from most *Hybomitra*, but agreeing with other *Tabanus*. The eye pattern (Fig. 83) is also more similar to the general pattern in other *Tabanus* than to that in *Hybomitra*.

Distribution. In Canada the species is restricted to British Columbia (Map 91), where specimens have been collected from 20 May to 4 September. The species reaches the southern border of Oregon, the middle of Idaho, and the western border of Montana.

Tabanus similis Macquart

Figs. 84, 180; Map 92

Tabanus similis Macquart, 1850:335.
Tabanus scutellaris Walker, 1850:27.
Tabanus lineola scutellaris Walker, of authors.

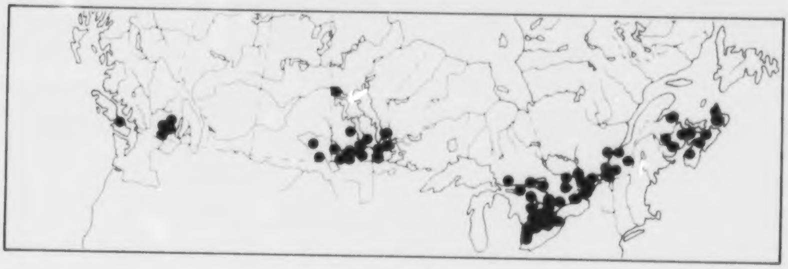
Female. Length 11–17 mm. Eye bare, reddish purple, with a blue transverse stripe in lower half and similarly colored V-shaped configuration occupying most of upper half (Fig. 84*a*). Frons yellowish gray pruinose, 3.3–3.8 times as high as basal width, distinctly widened above; basal callus glossy black, subquadrate, slightly narrower than frons, usually narrowly connected to median callus; median callus oval or elliptical, slender. Subcallus concolorous with frons, often partly denuded by abrasion. Clypeus and gena predominantly white pruinose, white-haired; only upper margin of gena yellowish; with black hair. Antenna yellowish to orange brown; apical flagellomere sometimes moderately darker brown; basal flagellomere 1.3–1.5 times as long as greatest width, with short obtuse dorsal angle and almost no dorsal excavation. Second palpomere creamy white, 2.8–3.3 times as long as greatest width, with a mixture of white and black hairs (Fig. 84).

Scutum grayish black, with faint longitudinal pale stripes and orange notopleural lobe; scutellum at least faintly reddish orange apically. Pleura and coxae mainly black, covered by whitish pruinosity; fore coxa and upper anepisternum orange; remaining leg segments yellow to orange; apex of fore tibia and all tarsi darkened. Halter yellow. Wing membrane clear.

Abdomen black dorsally, with median and sublateral pale pruinose white-haired longitudinal stripes; median stripe white and sublateral stripes yellowish to orange (Fig. 180). Sternites yellowish orange, mostly pale-haired, with faintly darker median stripe.

Male. Eye with dorsomedial area of enlarged ommatidia distinctly outlined, as much by the paler coloration as by size differential; antenna smaller and more slender than female; abdomen extensively yellowish orange, with black coloration greatly reduced or absent, thus longitudinal stripes less distinct.

Remarks. This species was known under the name *T. lineola scutellaris* Walker in the literature before 1965. It is one of five species in Canada having a median pale abdominal stripe, the others being *T. lineola* Fabricius, *T. nigrovittatus* Macquart, *T. quinquevittatus* Wiedemann, and *T. sagax* Osten Sacken. All are readily differentiated in the key. *Tabanus similis* is among the most frequently collected species of the genus and can be a significant pest of pastured livestock (Teskey 1961).



Map 92. Collection localities of *Tabanus similis*.

Larvae have been found in a variety of wetland habitats, some of which show evidence of being relatively dry for much of the year (Teskey 1969). These habitats correspond closely to those in which Tashiro (1950) found the species in association with *T. quinquevittatus*.

Distribution. *Tabanus similis* has a transcontinental distribution in the northern half of the United States, with northern extensions into the Okanagan Valley of British Columbia, southern Saskatchewan, Manitoba, and much of the southern portions of eastern Canada (Map 92). Its flight period extends from early June to mid August.

Tabanus sparus Whitney

Fig. 85

Tabanus sparus Whitney, 1879:38.

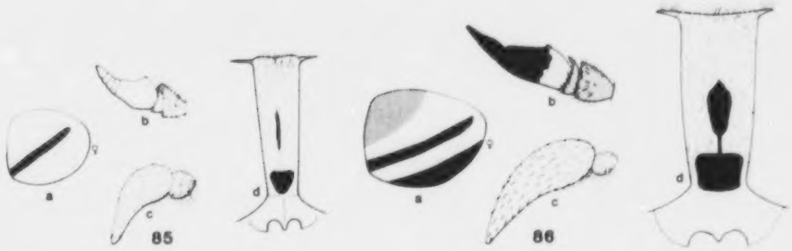
Female. Length 8–10 mm. Eye bare, unpatterned. Frons gray to brown, black-haired, 4.6–6 times as high as basal width, 1.5–1.9 times as wide above as below; basal callus brown to black, subquadrate, narrower than frons; median callus slender, sometimes connected to basal callus. Subcallus and upper margin of gena light brown, pruinose; remainder of gena white pruinose, white-haired. Antenna orange; basal flagellomere with obtuse dorsal angle and no excavation. Second palpomere creamy white, 2.7–2.9 times as long as greatest width, with white and sparsely scattered black hair (Fig. 85).

Thorax blackish brown; notopleural lobe and anepisternum reddish; scutum with faint longitudinal lines. Legs mainly black; basal two-thirds of fore tibia and all of mid and hind tibiae yellow. Wing membrane clear.

Abdomen dominantly black, with posterior margins narrowly white; tergites 2–6 with sublateral rows of oval yellowish white spots; tergites 1–3 with posterior margins expanding into median triangles. Sternites with posterior margins narrowly white.

Remarks. This species is not known in Canada, but its proximity in Michigan indicates that it may extend its range into southern Ontario. When abundant it can be a severe pest. Larvae were found in an abandoned cranberry bog and along boggy margins of a stream (Teskey 1969).

Distribution. *Tabanus sparus* is widespread over much of the United States, east of a line between Wisconsin and Louisiana, except northern New York to Maine.



Figs. 85, 86. Head features of *Tabanus sparus* (85) and *T. stonei* (86).

Tabanus sparus var. *milleri* Whitney

Fig. 85*a*

Tabanus milleri Whitney, 1914:344.
Tabanus sparus ssp. *milleri* Whitney; Stone, 1938:78.
Tabanus sparus var. *milleri* Whitney; Philip, 1965:336.

Female. Essentially identical to typical form but differing in having diagonal purple band on eye in fresh specimens or in rehydrated dried specimens (Fig. 85*a*).

Remarks. This variety, like the typical form of the species, has not been found in Canada, but because its range is about the same as that of the typical form, it might be found eventually in southern Ontario. It also is a biter of humans and animals, and when abundant can be a severe pest.

Larvae have been found among matted roots in muck at the edge of ponds (Hays and Tidwell 1967).

Tabanus stonei Philip

Fig. 86; Map 93

Tabanus stonei Philip, 1941c:144.

Female. Length 13–16 mm. Eye sparsely short pilose, bluish green; lower margin, median transverse band, and indefinite dorsomedian area dark bluish purple (Fig. 86*a*). Frons 2.9–3.5 times as high as basal width, widened above, grayish pruinose, with brownish tinge beside median callus; basal callus glossy black to dark brown, subquadrate, slightly narrower than frons, sometimes narrowly connected to smaller suboval median callus. Vertex with pair of vestigial ocellar-like spots, often associated with irregular denudation of area. Subcallus more or less yellowish pruinose. Clypeus and gena white pruinose, white-haired. Antenna with scape, pedicel, and often base of basal flagellomere reddish, sometimes obscurely so; remainder of flagellum black; basal flagellomere with obtuse dorsal angle and little or no dorsal excavation. Second palpomere creamy white, about three times as long as greatest width, with a mixture of black and white hair (Fig. 86).

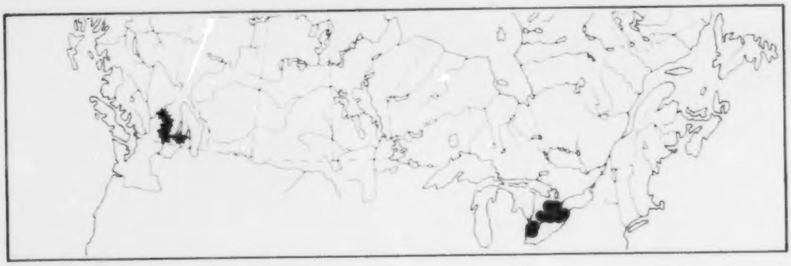
Scutum and scutellum grayish black; scutum with median and sublateral paler stripes; notopleural lobe reddish; pleura whitish pruinose, white-haired. Femora, basal third or more of fore tibia, and all tarsi black; remainder of tibiae yellow. Halter brownish black. Wing membrane clear.

Abdomen black, black-haired; tergite 2 with side sometimes lightly yellowish orange; all tergites with median row of triangles and with sublateral patches; triangles widest at posterior margins and nearly crossing tergites; patches yellowish-gray, obliquely inclined, nearly or quite crossing at least tergites 2 and 3; tergites with patches, posterolateral margins, and lateral margins white-haired. Sternites grayish black to reddish, paler on posterior margins, and white-haired, except on terminal segments.

Male. Similar in body coloration to female. Eye pilose, with hairs longer on dorsomedial area of slightly enlarged ommatidia; enlarged ommatidia weakly differentiated from area of small ommatidia. Second palpomere oval, less than 1.5 times as long as wide, with only white hair. Antenna more slender than female.

Remarks. This species is nearest to *T. laticeps* Hine in the Canadian fauna but is readily distinguished by its grayish appearance, especially the scutal lines and the median and sublateral abdominal gray spots. *Tabanus laticeps* is more colorful, especially laterally on the abdomen.

Burger (1977) found larvae in rotting logs lying in a seepage area in New Mexico and described both the larva and pupa.



Map 93. Collection localities of *Tabanus stonei* and *T. stygius*.

Distribution: The species has been collected in Canada only in south-central British Columbia (Map 93), this being the northern limit of a range that includes much of the United States west of South Dakota, Colorado, and New Mexico. Collection dates extend from 1 June to 11 August.

Tabanus stygius Say

Fig. 87; Map 93

Tabanus stygius Say, 1823:33.

Female. Length 18–24 mm. Eye bare, green, with 3 faint transverse darker stripes, the upper stripe short (Fig. 87*a*). Frons 3.6–4.5 times as high as basal width, slightly widened above; basal callus shiny, convex, longer than wide, nearly width of frons, connected to slender median callus. Subcallus pruinose. Antenna with scape, pedicel, and usually terminal flagellomeres darker than orange basal flagellomere; basal flagellomere about two-thirds as wide as long, with acute dorsal angle and shallow dorsal excavation. Second palpomere 3.6–4.2 times as long as greatest width (Fig. 87).

Scutum, scutellum, and upper half of notopleural lobe whitish pruinose, white-haired. Basal half of fore tibia and all of mid and hind tibia reddish; remainder of legs, thoracic pleuron, and abdomen dark brown to black. Wing moderately darkened anteriorly; dark spots on crossveins; veins furcated.

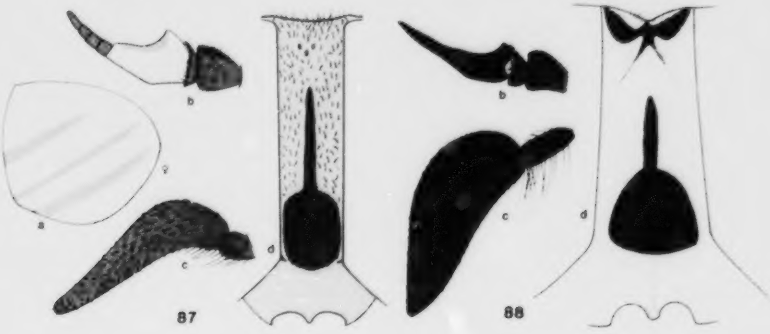
Abdomen completely black.

Male. Eye with upper median area of enlarged ommatidia rather sharply differentiated, second palpomere oval, about twice as long as wide; scutum and scutellum brown pruinose and brown-haired, but elsewhere colored as in female.

Remarks. This large rather distinctively colored species closely resembles *T. punctifer* Osten Sacken in western North America.

Egg masses have been found on aquatic vegetation growing in shallow water (Schwardt 1936; Philip 1931), and larvae have been taken from the muddy banks of a stream.

Distribution. In Canada the species has been found only in southern Ontario (Map 93), with collections infrequent and extending from late June to much of August. Its North American range extends from southern Minnesota to New Hampshire, south to Florida and eastern Texas, with a tongue reaching to Colorado.



Figs. 87, 88. Head features of *Tabanus stygius* (87) and *T. subniger* (88).

Tabanus subniger Coquillett

Fig. 88

Tabanus subniger Coquillett, 1906:48.

Female. Length 22–25 mm. Eye bare, apparently without color pattern. Frons about twice as high as basal width, narrowed above; median callus narrow, connected to reddish black basal callus; basal callus narrower than frons. Vertex notched. Subcallus pruinose. Antenna dark reddish brown to black; basal flagellomere slender, with prominent dorsal excavation. Subcallus, clypeus, and gena grayish brown; black-haired. Palpus black, 2.5 times as long as greatest width (Fig. 88).

Thorax with scutum and scutellum whitish pruinose, white-haired, contrasting markedly with darker pleura, black legs, and black abdomen, all having black hair. Wing with costal cell and margins of veins and especially vein forks and crossveins pigmented.

Male. Similar to female except as follows: Eye with dorsomedial ommatidia about twice as large as ventral and lateral ommatidia; ventral and lateral ommatidia sharply differentiated. Clypeus and gena more darkly pruinose, more abundantly black-haired. Scutum and scutellum brown, mostly black-haired, and not strongly contrasting with rest of thorax and abdomen. Wing marking less intense. Abdomen without paler tergal markings.

Remarks. This species is most similar to *T. stygius* Say but is readily differentiated by the dimensions of the frons, antenna, and palpus as given in the key.

Distribution. Only one Canadian specimen is known to me, from Erindale, Ont., collected 16 June 1932. The species is rare throughout the remainder of its range, which extends from eastern Missouri to southern Michigan, Maryland, and New York.

Tabanus sulcifrons Macquart

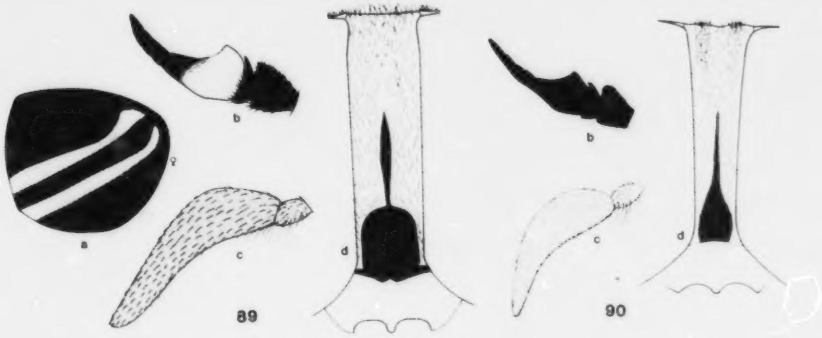
Fig. 89

Tabanus sulcifrons Macquart, 1855:53.
Tabanus variegatus Fabricius, 1805:95.
Tabanus tectus Osten Sacken, 1876:436.
Tabanus exul Osten Sacken, 1878:558.

Female. Length 18–23 mm. Eye bare, dark purplish, with 2 transverse green stripes (Fig. 89*a*). Frons 4–4.5 times as high as basal width, slightly widened dorsally, gray pruinose; basal callus glossy brown, subquadrate, slightly narrower than frons, often narrowly connected to slender median callus. Subcallus, clypeus, and gena gray pruinose, mainly white-haired. Antenna with scape, pedicel, and terminal flagellomeres black; basal flagellomere orange or rarely darkened apically; basal flagellomere 1.2–1.5 times as long as greatest width, with dorsal angle approximately 90° and dorsal excavation prominent. Second palpomere four to five times as long as greatest width, orange brown, with black hair (Fig. 89).

Scutum and scutellum dark brown; scutum with faint longitudinal paler stripes bearing yellow hair, the black hair mainly confined to brown areas; notopleural lobe orange. Pleura and legs brown with whitish pruinosity and mainly white hair; fore legs mainly darker than other legs; basal half of tibia yellowish. Halter brown. Wing lightly pigmented, especially anterobasally and in costal cell; brown spots on crossveins and furcation of R_{4+5}; cell r_5 more or less narrowed toward wing margin.

Abdomen orange, often dark brown on posterior segments; abdomen dorsally with median row of triangular pale spots, not crossing tergites; tergites with posterior margins narrowly pale, the pale areas mainly yellow-haired, with black hairs elsewhere. Sternites yellow-haired, except on terminal sternites; posterior margins narrowly paler.



89 90

Figs. 89, 90. Head features of *Tabanus sulcifrons* (89) and *T. superjumentarius* (90).

Male. Similar to female, except as follows: Eye with dorsocentral area of enlarged ommatidia prominently differentiated from bordering small ommatidia. Antenna smaller; basal flagellomere about 1.6 times as long as greatest width. Second palpomere with long brown hair, about twice as long as wide, widest near apex.

Remarks. Only the characters given in the key are adequate for separating the majority of specimens from *T. limbatineuris* Macquart. Some overlap in one or more of the characters may occur, thus making identification doubtful.

Teskey (1969) and Tidwell (1973) have described larvae identified as *T. sulcifrons*. The larva described by Teskey was subsequently found to be *T. limbatineuris*. Problems recently brought to light by Burger (1980) on the true identity of certain regional populations of what is called *T. sulcifrons* bring to question the identity of Tidwell's larvae.

Distribution. As currently known, the North American distribution of this species covers almost all the eastern United States from Kansas and Texas, except southern Florida and the New England States. It occurs in Ontario only in the Niagara Peninsula. Collection dates for these specimens are late July to early August.

Tabanus superjumentarius Whitney

Fig. 90

Tabanus superjumentarius Whitney, 1879:37.

Female. Length 15–19 mm. Eye bare, without color pattern. Frons 4.8–5.6 times as high as basal width, moderately widened above; basal callus oblong, brown, narrower than frons, connected to linear median callus. Subcallus pale brown pruinose. Clypeus and gena white pruinose, white-haired. Antenna brown; basal flagellomere with dorsal angle about 90° and dorsal excision well developed. Second palpomere grayish yellow, 3.2–3.9 times as long as greatest width, covered with short black hair (Fig. 90).

Thorax distinctly paler than abdomen; scutum with submedian and sublateral darker stripes; scutellum and notopleural lobe reddish. Legs dark brown to black. Wing with costal cell yellow; margins of anterior veins, crossveins, and vein junctions faintly pigmented.

Abdomen dorsally black; tergites 3–5 with median row of white triangles; tergites 2 and 6 sometimes with smaller white triangles. Sternites black, with lateral thirds appearing more grayish as a result of more white hairs and white pruinosity.

Male. Similarly colored to female. Greatly enlarged ommatidia sharply differentiated on upper median, somewhat flattened area of eye. Thorax and abdomen somewhat brownish; thorax without white hair and thus not as contrasting as in female.

Remarks. This species shares the distinctive feature of a paler thorax than abdomen with *T. stygius* Say, *T. subniger* Coquillett, *T. punctifer* Osten Sacken, and *T. trimaculatus* Palisot du Beauvois. It is readily differentiated from the first three by having median white triangles on the abdominal tergites. From *T. trimaculatus*, to which it is apparently most closely related, it differs most strikingly in tibial color.

Distribution. This species has not yet been found in Canada, but its presence along the southern borders of Lakes Erie and Ontario and in northern Vermont and New Hampshire indicates its possible presence there. The southern and western limits of the species are Georgia, Alabama, and Missouri.

Tabanus trimaculatus Palisot de Beauvois

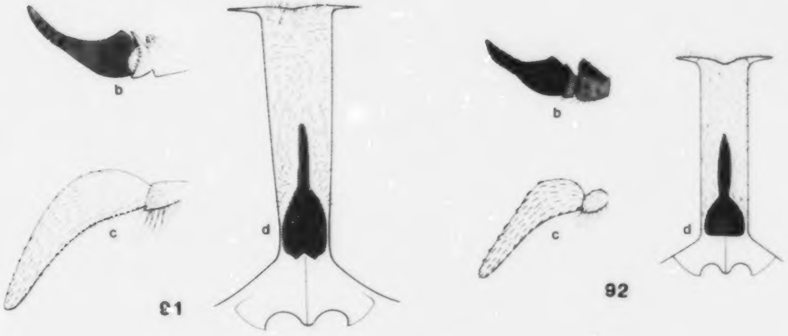
Fig. 91

Tabanus trimaculatus Palisot de Beauvois, 1806:56.
Tabanus quinquelineatus Macquart, 1834:200.

Female. Length 13–19 mm. Eye bare, without color pattern. Frons 5.2–5.5 times as high as basal width, moderately widened above, gray pruinose; basal callus reddish, oblong, narrower than frons, connected to slender median callus. Subcallus, clypeus, and gena gray pruinose; subcallus white-haired. Antenna black; basal flagellomere about two-thirds as broad as long, with dorsal angle slightly acute and with concave dorsal excavation; apical flagellomeres about as long as width of basal flagellomere. Second palpomere creamy white, 3.5–3.8 times as long as greatest width, with short black hair (Fig. 91).

Thorax dominantly white pruinose, white-haired, especially laterally, and strongly contrasting with black abdomen; scutum with submedian and sublateral pairs of darker reddish stripes. Legs with basal half of fore tibia and basal three-quarters or more of mid and hind tibia white; remainder of legs black. Wing with costal cell and margins of basal veins, crossveins, and vein furcations pigmented.

Abdomen black, with areas of white pruinosity; tergites 3–5 with white hair forming median triangles; white hair covering lateral third of all sternites and encroaching on lateral reflexed margins of tergites.



Figs. 91, 92. Head features of *Tabanus trimaculatus* (91) and *T. vivax* (92).

Male. Similar to female except as follows: Eye with extensive upper median area of enlarged ommatidia sharply differentiated from bordering smaller ommatidia; smaller ommatidia reddish to yellow, sometimes with median black transverse stripe.

Remarks. The relationship of this species to others has been briefly mentioned under *T. superjumentarius*.

Egg masses are deposited on emergent vegetation at the edge of ponds and slow-flowing streams. Larvae develop in the organic mud associated with these habitats (Goodwin 1975; Tidwell 1973).

Distribution. One specimen from Guelph, Ont., has been seen. The proximity of the species in western New York, Ohio, and Michigan indicates that it could be found in the Niagara Peninsula or in southern counties of Ontario. The distribution of the species in the United States includes most of the eastern half of the country, except southern Florida, most of New York, and the northern New England States.

Tabanus vivax Osten Sacken

Fig. 92; Map 94

Tabanus vivax Osten Sacken, 1876:446.
Tabanus arborealis Stone, 1935:14.

Female. Length 12–15 mm. Eye bare, unicolorous. Frons grayish brown pruinose, 3.8–4 times as high as basal width, nearly parallel-sided; basal callus reddish brown to black, as tall as broad, slightly narrower than frons, and usually with relatively wide connection to linear black median callus. Vertex usually shallowly notched. Subcallus and upper margin of gena pale brown. Clypeus and gena predominantly white pruinose, white-haired; upper margins with some black hair near them. Antenna with scape and pedicel brown; flagellum mostly to completely black; basal flagellomere with obtuse dorsal angle and little or no dorsal excavation. Second palpomere pale brown, 3.0–3.5 times as long as greatest width. with black and white hair; white hair predominant at base; dorsal curvature strongest basally (Fig. 92).

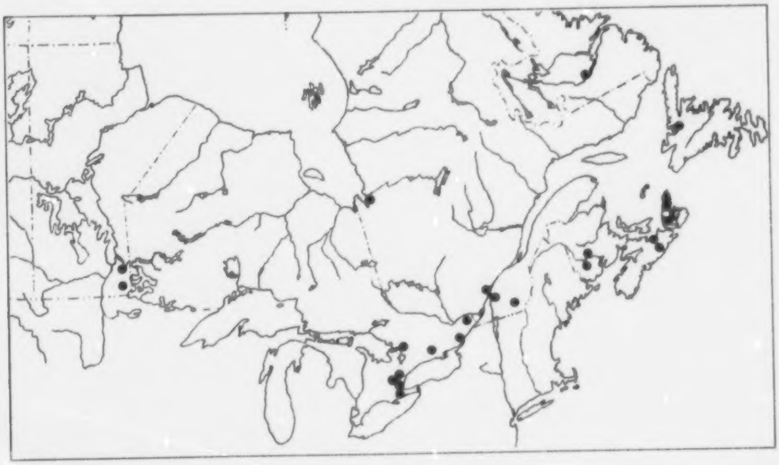
Scutum black with usual longitudinal faintly paler stripes. Notopleural lobe reddish. Pleura predominantly black, with white hairs; anepisternum reddish, with abundant black hairs; all sclerites white pruinose. Legs reddish brown; apex of fore tibia and all tarsi somewhat darker. Halter brown. Wing membrane clear.

Abdomen dorsally with median row of equilateral white triangles based on posterior margins of tergites 2–5 but not crossing tergites; tergites 2 to 3 or 4 with sublateral spots; spots slightly oblique, yellowish, connected to narrow white posterior margins; pale areas of abdomen whitish pruinose and white-haired, and darker areas black-haired. Sternites brownish, with indefinite darker median stripe resulting from predominance of black hairs.

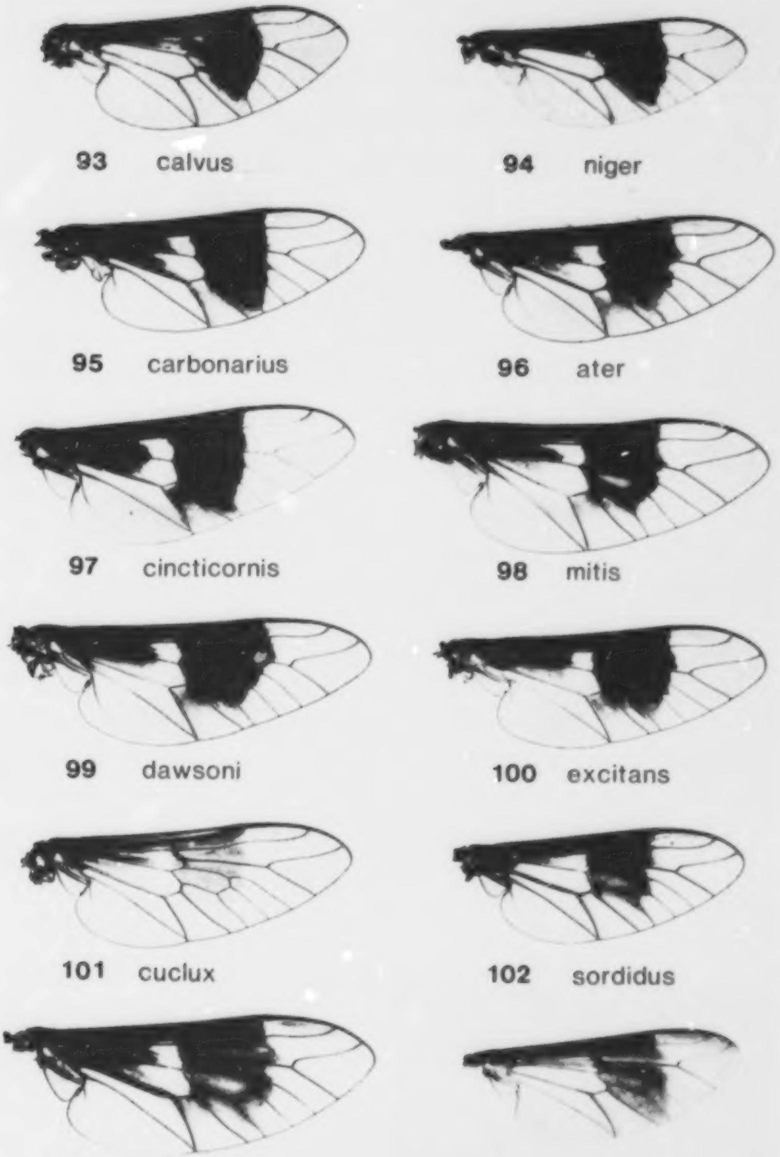
Male. Similar to female except as follows: dorsomedial area of enlarged ommatidia distinctly differentiated from smaller surrounding ommatidia; antenna narrower but of generally similar shape to female; second palpomere oval, 1.5 times as long as broad.

Remarks. The great similarity of *T. vivax* to *T. fairchildi* Stone and the past confusion in identifying the two have been mentioned under the latter species. *Tabanus vivax* is apparently more abundant than adult collection records indicate, based on the frequency of larval collections (Teskey 1969). Larvae were found in organic substrates in semibog-like habitats bordering streams.

Distribution. This species is confined to the eastern half of Canada (Map 94) and extends south to Maryland and West Virginia. In Canada collections were made from 22 June to early August.



Map 94. Collection localities of *Tabanus vivax*.



93 calvus

94 niger

95 carbonarius

96 ater

97 cincticornis

98 mitis

99 dawsoni

100 excitans

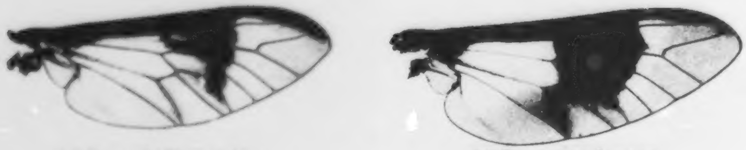
101 cuclux

102 sordidus

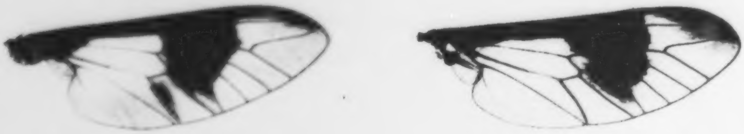
103 noctifer

104 surdus

Figs. 93–104. Wings of *Chrysops*.

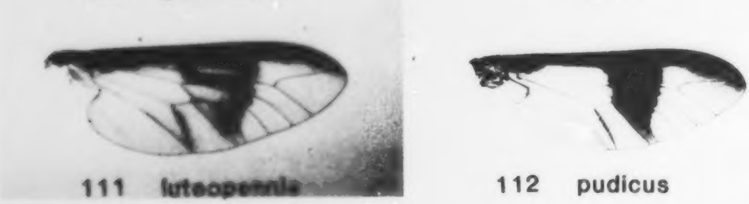


105 delicatulus 106 aestuans

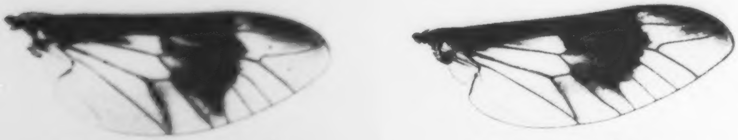


107 callidus 108 lateralis

109 geminatus 110 sackeni



111 luteopennis 112 pudicus

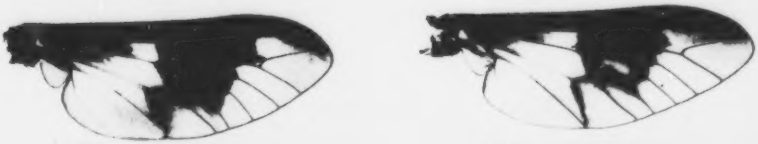


113 coloradensis 114 furcatus

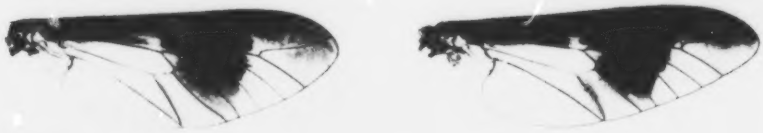
115 proclivis 116 flavidus

Figs. 105–116. Wings of *Chrysops*.

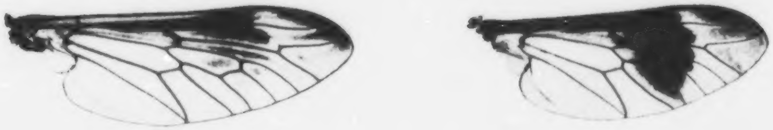
117 celatus 118 montanus



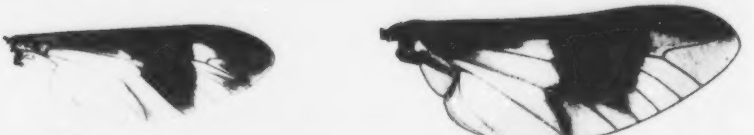
119 nigripes 120 zinzalus



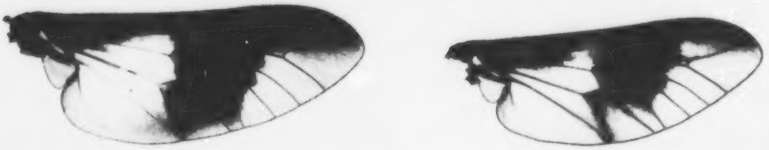
121 striatus 122 indus



123 shermani 124 univittatus

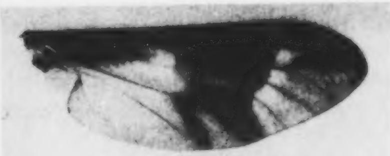


125 pikei 126 asbestos

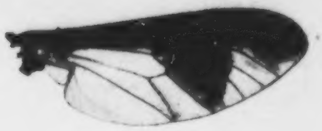


127 venus 128 frigidus

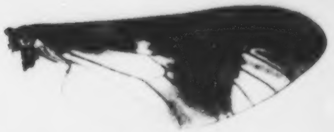
Figs. 117–128. Wings of *Chrysops*.



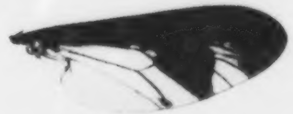
129 brunneus



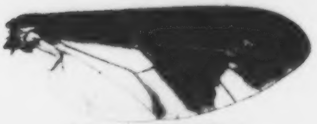
130 aberrans



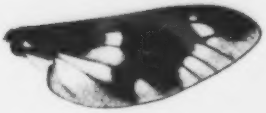
131 vittatus



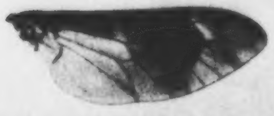
132 macquarti



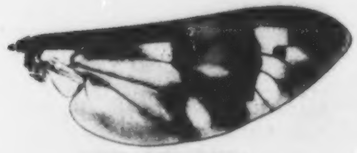
133 moechus



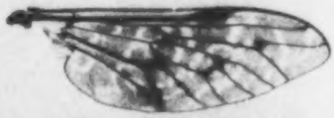
134 fulvaster



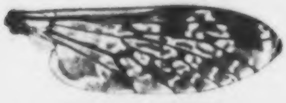
135 fuliginosus



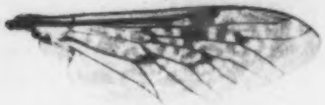
136 discalis



137 H. americana

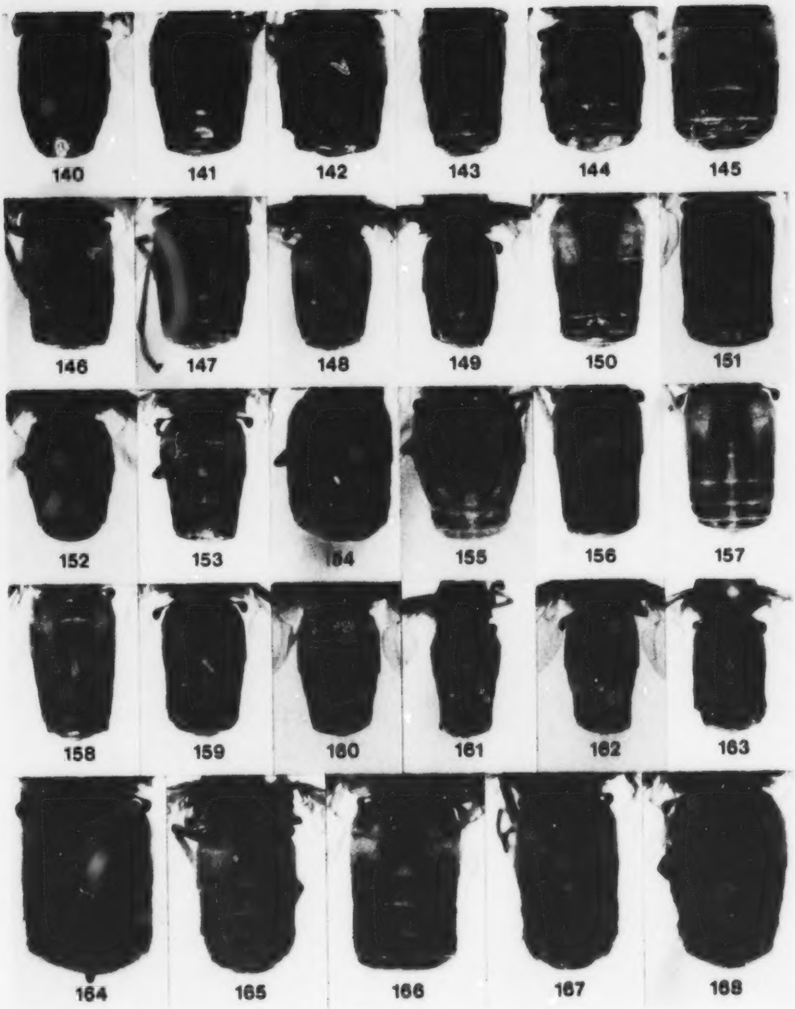


138 H. rara



139 H. champlaini

Figs. 129–139. Wings of *Chrysops* and *Haematopota*.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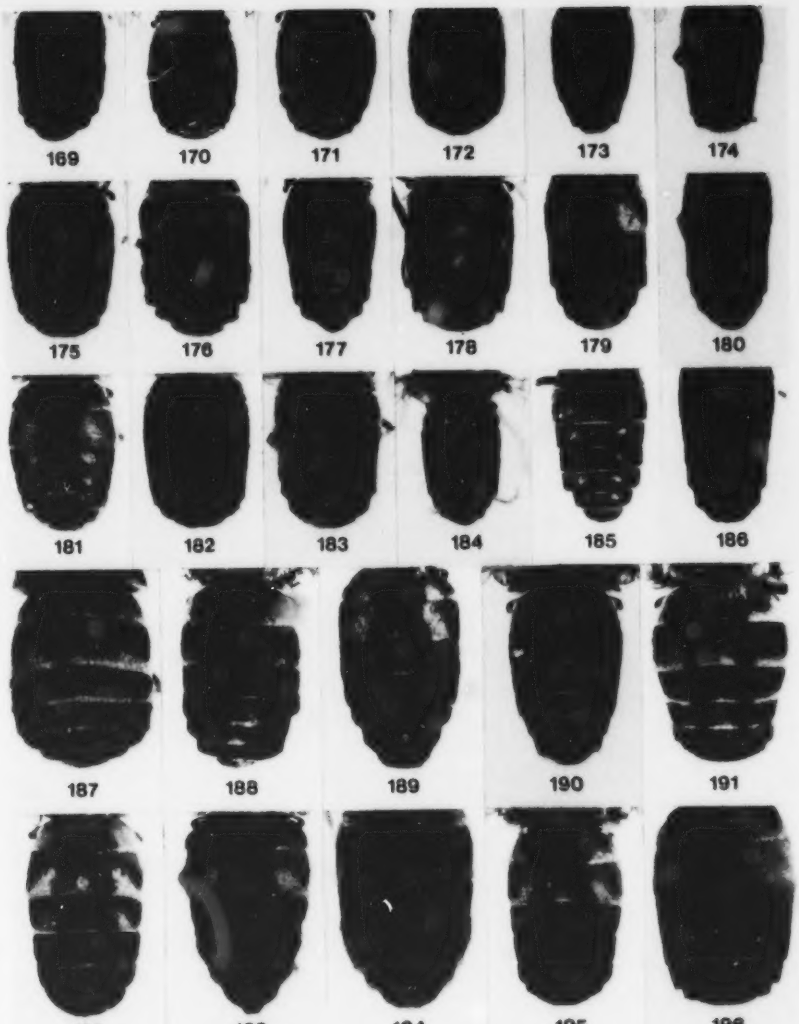
Figs. 140–168. Dorsal abdominal color patterns of *Chrysops* species: 140, *cuclux*; 141, *dawsoni*; 142, *noctifer*; 143, *zinzalus*; 144, *nigripes*; 145, *sordidus*; 146, *callidus*; 147, *indus*; 148, *celatus*; 149, *geminatus*; 150, *proclivis*; 151, *montanus*; 152, *fulvaster*; 153, *lateralis*; 154, *frigidus*; 155, *discalis*; 156, *striatus*; 157, *shermani*; 158, *vittatus*; 159, *aberrans*; 160, *moechus*; 161, *pikei*; 162, *macquarti*; 163, *univittatus*; 164, *excitans*; 165, *sackeni*; 166, *aestuans*; 167, *furcatus*; 168, *asbestos*.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Figs. 169–196. Dorsal abdominal color patterns of *Hybomitra* and *Tabanus* species: 169, *H. pechumani*; 170, *H. longiglossa*; 171, *H. typhus*; 172, *H. illota*; 173, *T. quinquevittatus*; 174, *T. nigrovittatus*; 175, *H. sexfasciata*; 176, *H. astuta*; 177, *T. nigripes*; 178, *H. sodalis*; 179, *T. marginalis*; 180, *T. similis*; 181, *H. lasiophthalma*; 182, *H. melanorhina*; 183, *H. rhombica*; 184, *H. minuscula*; 185, *T. pumilus*; 186, *T. sackeni*; 187, *H. zonalis*; 188, *H. osburni*; 189, *T. reinwardtii*; 190, *T. fulvicallus*; 191, *T. sequax*; 192, *H. microcephala*; 193, *H. aurilimba*; 194, *H. affinis*; 195, *H. trepida*; 196, *H. criddlei*.

Glossary

aedeagus A long slender tube in the male terminalia that at rest lies coiled within a conical sheath; used for the transfer of sperm.

anepisternum Prominent mesothoracic pleural sclerite behind anterior spiracle.

antenna (pl. **antennae**) A pair of 6- to 10-segmented sensory appendages arising on the front of the head above the clypeus and between the eyes (see also scape, pedicel, and flagellum, Figs. 2–4).

apical (see **distal**)

apical wing spot The darkening of variable extent in the anteroapical part of the wing (Fig. 9).

basal callus The lower of possibly two glossy areas on the frons, bordering the subcallus (Fig. 1).

basal flagellomere The usually expanded or often otherwise modified fusion product of the first 4 flagellomeres, sometimes called the basal plate (Figs. 2–4).

basicosta The second sclerite on the leading edge of the wing of Diptera.

basitarsi The first segment of the tarsus.

calypteres The two posterior basal membranous lobes of the wing.

cell An area of the wing bounded by veins; named usually for the vein along its anterior margin and written in lower case (Fig. 8).

cercus (pl. **cerci**) Paired, subcircular, dorsoapically flap-like processes on the terminal abdominal segment (Figs. 6, 7).

clypeus A shield-shaped sclerite on the front of the head below the antennae and bordered laterally by the frontogenal sutures (Fig. 1).

costa (abbr. **C**) The thickened anterior margin of the wing, extending from base to apex (Fig. 8).

coxa The basal segment of the leg.

crepuscular Active or flying at dusk.

crossband A transverse darkening of the middle of the wing from the costal margin, almost or quite reaching the hind margin, and usually including the discal cell (Fig. 9).

denuded Lacking hairs and pruinosity; usually of shiny appearance.

dichoptic The compound eyes distinctly separated on the frontal surface of the head.

distal (or **apical**) Parts of appendages and other attached structures that lie farther from the body; the opposite of proximal (or basal).

facet The cornea or lens of an individual ommatidium of which many constitute the compound eye.

femur (pl. **femora**) The third and thickest segment of the leg, following the coxa and trochanter.

flagellomere One of the subdivisions of the flagellum.

flagellum The apical part of the antenna, beyond the pedicel. In Tabanidae it is usually rather stout and tapered apically, comprising 8 flagellomeres, but often the first 4 flagellomeres are combined and individually indistinguishable (Figs. 2–4).

frons The upper median area of the head between the subcallus and the dorsal margin of the head, bounded laterally by eyes (Fig. 1).

frontal callus (pl. **calli**) A glossy area on the frons extending dorsally to or beyond the middle of the frons; in the plural form referring collectively to the basal and median calli.

geminate Arranged in pairs composed of two similar parts.

gena (pl. **genae**) The area between the clypeus and the eye, below the subcallus, and extending to the lower margin of the head (Fig. 1).

genital chamber (or **vagina**) A pouch-like cavity between sternites 8 and 9 of the female abdomen into which the common oviduct opens.

glossy A shiny smooth surface with sparse hair; opposite of pruinose.

gonocoxite The basal segment of the gonopod (Fig. 7).

gonopod The two-segmented paired appendage that constitutes a major part of the male terminalia, consisting of a basal gonocoxite and a dorsal gonostylus.

gonostylus The apical segment of the gonopod, or clasper (Fig. 7).

halter (pl. **halteres**) A club-shaped appendage, representing the reduced metathoracic wing, arising from the posterior dorsal corner of the thorax (Fig. 5).

holoptic Having the two compound eyes contiguous, dividing the front into an upper and a lower part.

hyaline triangle The clear, undarkened area of a *Chrysops* wing between the darkened crossband, the apical spot, and the posterior apical margin of the wing (Fig. 9).

hypopharynx A stylet-like structure below the mandibles and the maxillae that helps provide the ventral closure of the food duct in the labrum and has the salivary duct running through its entire length.

infuscated Darkened with a brownish tinge.

interior cell(s) Any wing cell not bordering the edges of the wing; specifically the two basal cells (br and bm) and the discal cell (d).

intersegmental membrane The nonsclerotized ectodermal membrane between sclerotized segmental plates.

labellum (pl. **labellae**) The paired fleshy endings of the labium.

labium The outer ventral trough-like part of the proboscis; it holds the remaining mouthparts and ends in a pair of broadened labellae.

labrum The upper lip, a median unpaired flap above the mouth and mandibles; the uppermost stylet of the proboscis, whose edges are rolled ventrally and medially to form a tube-like food canal.

maculations An arrangement of spots and markings.

mandible(s) The paired appendages between the labrum and maxillae; in female Tabanidae they are slender, sharp, and stylet-like.

maxilla (pl. **maxillae**) The paired mouthparts consisting in female Tabanidae of sharp, apically toothed stylets enclosed in the labial trough behind the mandibles, and connected basally to a pair of exposed 2-segmented, rather fleshy palpi.

maxillary palpus Two-segmented, usually fleshy sensory appendages projecting at the base of the proboscis.

median callus An elliptical to oval glossy area near the middle of the frons, often narrowly connected to the basal callus (Fig. 1).

median occipital sclerite The middorsal subtriangular sclerite on the postcranium, continuous with the frons.

median stripe A narrow middorsal longitudinal stripe of different-colored integument, pruinosity, or hairs.

mesally Toward the middle.

mesonotum The dorsal part of the thorax, including the prescutum, the scutum, and the scutellum.

mesothorax The middle segment of the thorax, which because of the extensive development of the forewing muscles is much larger than the prothorax or the metathorax (Fig. 5).

metathorax The third segment of the thorax, closely associated with the mesothorax; distinguishable in that it bears the halter, the metathoracic spiracle, and the hind legs (Fig. 5).

notopleural lobe A lateral triangular convex sclerite of the mesonotum, lying anterior to the wing base (Fig. 5).

ocellar tubercle The usually slightly swollen, often partly glossy area of the frons near the vertex, bearing the ocelli or their faint vestiges (Fig. 1).

ocelli The three simple, single-lensed eyes on the vertex of the head.

occipital foramen The opening between the head and thorax.

occiput The posterior surface of the head.

palpal segment One of two divisions of the maxillary palpus (Fig. 1).

pedicel The second segment of the antenna (Fig. 2).

pleura The lateral surface of the thorax.

postocular fringe A regular row of hairs, sometimes quite long and variably colored, on the dorsal postcranium bordering the eyes.

post (as prefix) Lying behind.

posttibial fringe A longitudinal row of longer hairs on the posterior surface of the hind tibia.

prementum The basal part of the labium, forming a trough in which the mandibles, maxillae, and hypopharynx lie.

proboscis The tubular bundle of stylets formed from the mouthparts (labrum, mandibles, maxillae, hypopharynx, and labium) of the adult (Fig. 1).

prothorax The first segment of the thorax, bearing the first pair of legs and the prothoracic spiracles (Fig. 5).

pruinose A dull matt surface resulting from minute hair-like outgrowths of the surface and looking like fine dust (pollinose or dusted, of authors).

radius (abbr. **R**) The second and thickest major longitudinal wing vein, branching near the basal third of the wing into an anterior branch (R_1) and a posterior branch, the radial sector (Rs), which subsequently branches farther (Fig. 8).

rosette A curved or circular darkened pattern of the wing, especially of species of *Haematopota* (Figs. 137–139).

scape The first segment of the antenna (Fig. 2).

scutellum A triangular to semicircular dorsally convex sclerite, projecting at the posterodorsal part of the thorax (Fig. 5).

scutum The large convex sclerite, forming most of the dorsal surface of the mesonotum (Fig. 5).

spermathecae Receptacles (3 in Tabanidae) for the storage of spermatozoa in females, leading through individual spermathecal ducts to the genital chamber adjacent to the opening of the common oviduct.

spur vein A short offshoot from the base of the anterior of 2 terminal branches of the radius (Fig. 8).

stem cell A cell in the extreme base of the wing, bordered by the radial vein (br) anteriorly and basal cells (bm) distally.

sternite The sclerite or sclerotized plate of the sternum or the ventral part of a segment.

subcallus A subtriangular area on the front of the head, bounded by antennae below, eyes laterally, and the frons above; often lacking pruinosity and thus glossy (Fig. 1).

subgena (pl. **subgenae**) The ventral margin of the head, continuous with the gena, between the eye and the base of the maxillary palpus.

suprageneric The taxonomic categories above the genus.

supralar lobes Posterior lateral area of thoracic scutum, slightly posterior of wing base.

sympatry Two species occupying the same range.

tarsal claws A pair of claws arising from the apical tarsomere of all legs, with those of fore leg of some species differing in length.

tarsus (pl. **tarsi**) The apical part of the leg, divided into 5 divisions or tarsomeres.

tentorial pits Two depressions situated ventrolaterally on the frontogenal suture, which marks the margin of the clypeus. They are connected internally to the apodemes and extend to the back of the head, providing it with additional strength (Fig. 1).

terminalia The abdominal segments, bearing the excretory and reproductive organs, including segments 8–10.

tergite The sclerite or sclerotized plate of the tergum or dorsal part of the segment.

tibia (pl. **tibiae**) The fourth segment of the leg, between the femur and tarsus.

tibial spurs The paired stout setae situated ventroapically on the mid tibia of all Tabanidae and in the same position on the hind tibiae of more primitive family members.

truncate Having the end square.

vagina See genital chamber.

vertex The dorsal margin of the head, bordered anteriorly by the eyes and frons and posteriorly by the occiput (Fig. 1).

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